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The Archeology of Civil War Naval Operations at Charleston Harbor, South Carolina, 1861-1865

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The Archeology of Civil War Naval Operations at Charleston Harbor, South Carolina, 1861-1865



Maritime Research Division
South Carolina Institute of Archaeology and Anthropology
University of South Carolina
Columbia, South Carolina 29208

For the
American Battlefield Protection Program
National Park Service
Washington, District of Columbia
Grant Number GA-2255-08-025

Written by: James D. Spirek

27 November 2012

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**ARPA-redacted Version
For Public Distribution**

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For the

**American Battlefield Protection Program
National Park Service
Washington, District of Columbia 20005
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27 November 2012

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***“... if you wish to see war every day and night,
this is the place [Charleston] to see it.”***

George E. Dixon
21st Alabama Infantry
Captain, *H.L. Hunley*
5 February 1864

Executive Summary

In 2008 the Maritime Research Division (MRD) of the South Carolina Institute of Archaeology and Anthropology at the University of South Carolina received a National Park Service American Battlefield Protection Program (ABPP) grant to study the naval operations at Charleston Harbor during the American Civil War. The ABPP provides these funds to encourage preserving and protecting battlefields and sites that influenced American history, promoting and assisting in preservation management and planning of these sites, and increasing awareness and appreciation of preserving these significant battlefields and sites for future generations. Funds from the ABPP grant allowed the MRD to undertake historical research and archeological investigations on cultural resources remaining on the Charleston Harbor Naval Battlefield, the scene of a protracted struggle from 1861 to 1865 between Confederate defenders and Federal attackers. This report, *The Archeology of Civil War Naval Operations at Charleston Harbor, 1861-1865*, presents the findings and recommendations generated by our study of this significant naval battlefield.

The main objectives of this project were to define and delineate the Study Area, Core Area, Defining Features, and the Potential National Register Boundary of the Charleston Harbor Naval Battlefield through historical and archeological documentation. Identifying the historical and archeological extent of the battlefield to include the Defining Features composed of cultural, natural, and military features of the landscape aided in determining the project Study Area and the Core Area of combat actions all encompassed in a Potential National Register Boundary. A corollary objective included gathering historical data to aid in locating known and potential archeological resources, and helping interpret the battlefield and the implements of war remaining on the battlefield. A modern military analysis scheme called KOCOA, a method to understanding the natural, cultural, and military features of the landscape and their effect on the battle, provided a framework to analyze and interpret the Charleston Harbor Naval Battlefield.

Fieldwork to support the project objectives consisted of conducting marine remote sensing operations to gather additional information on previously recorded sites including the Federal ironclads *Patapsco*, *Weehawken* and *Keokuk*, and to locate undocumented sites, including the First and Second Stone Fleets and Battery Wagner. Archeologists and volunteers ground-truthed several magnetic and acoustic anomalies and dove on several wreck sites including *Patapsco*, First Stone Fleet, and the blockade runners *Constance* and *Georgiana/Mary Bowers* shipwreck complex. In addition to investigating underwater sites, archeologists documented several terrestrial sites including buried blockade runners at Fort Moultrie on Sullivan's Island and on the beach front of the Isle of Palms, and the Swamp Angel Battery and reported remains of the *Weehawken* Torpedo Raft behind Morris Island.

The historical and archeological information derived from this project to document the boundary and cultural remnants of Charleston Harbor served not only to illuminate the past, but also the present and future of this important naval battlefield. By delineating the boundary and documenting extant features, managers charged with the preservation of these

nationally significant cultural resources can use these findings to interpret and to protect the battlefield. By knowing the natural and cultural locations of these resources in the present, managers may better anticipate looming and distant issues surrounding the preservation of these battlefield vestiges. Two major developmental issues with the potential to impact the Charleston Harbor Naval Battlefield are navigation improvement and beach renourishment projects. The continuing research, educational, and recreational potential of this naval battlefield requires all interested stakeholders to participate in the preservation of this unique Civil War legacy.

Acknowledgments

The project was made possible through an American Battlefield Protection Program (ABPP) grant administered by the National Park Service (NPS). Additional funding was provided by the South Carolina Institute of Archaeology and Anthropology (SCIAA) at the University of South Carolina Columbia. A number of institutions and volunteers assisted and supported the project objective of documenting the naval components related to the siege of Charleston Harbor during the American Civil War:

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Chapter 1 Introduction

In 2008, the Maritime Research Division (MRD) of the South Carolina Institute of Archaeology and Anthropology at the University of South Carolina Columbia, applied for and received an American Battlefield Protection Program (ABPP) grant to study the Charleston Harbor Naval Battlefield. This Civil War battle between Confederate defenders and Union besiegers was a protracted struggle that lasted from 1861 to 1865. The ABPP is administered by the US Department of the Interior's National Park Service in Washington, DC. The program promotes the preservation of significant historic battlefields located on American soil. The goals of the program are to protect battlefields and sites associated with armed conflict, to encourage the interpretation, preservation, and management of these sites, and to raise awareness and appreciation of the importance in preserving battlefields and related sites for future generations. The ABPP supports these goals through yearly competitive grants to a variety of federal, state, local, and private organizations. The following report discusses the scope and findings of the project and concludes with management recommendations to meet the goals of preserving the naval battlefield for future generations.

The main purpose of this project was to define and delineate the Study Area, Core Area, Defining Features, and the Potential National Register Boundary of the Charleston Harbor Naval Battlefield through historical and archeological documentation. The Study Area of a battlefield reflects the historical extents of the battle and incorporates the areas of battle, maneuvers, withdrawals, and combat actions. The Core Area is defined as where direct combat occurred on the battlefield. Defining Features of the battlefield comprise the natural, cultural, and military features of the landscape. Delineating the Potential National Register Boundary of a battlefield requires a defensible justification through historical research, archeological features, and encompasses key landmarks, significant events, and reflects the extent of the battle (DOI 2007). The historical and archeological research undertaken to meet these objectives has provided solid evidentiary data to identify, define, and delineate the boundaries of the Charleston Harbor Naval Battlefield.

One of the main objectives was to identify the Study Area boundary of the battlefield to define the project research area. Historical research indicated the combatants at Charleston considered the naval battlefield to extend in the Atlantic Ocean from the northeast at Dewees Inlet to the southwest at Stono Inlet. The eastern bounds extended to the 18-foot contour, or 3 fathom line, and slightly further offshore. The contour line was a natural feature of the harbor but was culturally defining due to the drafts of the Union blockaders stationed off Charleston. The area between the Main Ship Channel entrance to the inner harbor and to the city was the western bounds of the battlefield. The MRD implemented the project to document the history and archeology of the naval actions that occurred within these bounds.

The siege of Charleston lasted for over four years and resulted in an extensive field of operations centered on the main harbor entrance into Charleston Harbor. The research focus

of this project was on the offensive and counter-offensive measures used at the main naval avenue of approach into Charleston via the Atlantic Ocean by way of Charleston Harbor. Through archeological and historical research a number of known and potential cultural features associated with the naval operations at the harbor were documented, namely ironclads, wrecked blockade runners, avenues of approach, now-submerged land batteries, and obstructions. Besides identifying the physical remains on the battlefield, the project intended to identify the naval positions of attack on other ships and against land batteries, especially the 7 April 1863 Union ironclad attack against Fort Sumter.

To accomplish the goals of defining the battlefield boundary, the accurate positioning and extent of the associated features required the use of Differential Global Positioning System (DGPS) and a variety of non-disturbance remote sensing technologies. Historical and previous archeological research guided the field operations to pinpoint known sites and to survey for historically-documented wreck sites, now-submerged batteries, and other features. One problem noted in past surveys in the Charleston area, and throughout the state, is the actual positioning of known and documented sites oftentimes is located hundreds of yards from historically or archeologically recorded locations. Therefore, a key goal of this project was to precisely relocate previously documented sites using DGPS, as well as to determine the scope and extent of the wreckage using a variety of appropriate electronic devices.

A corollary project goal was to examine the defining natural, cultural, naval, and military engineering features of this maritime battlefield. Analysis of the battlefield using the KOCOA methodology, a modern set of military considerations to prepare for combat action, aided to interpret and place into context the boundary and the features associated with the battlefield. Refer to chapter 4 for a full discussion of this analytical paradigm as applied to the naval battlefield. From this analysis framework MRD derived an understanding of the natural, cultural, and military constraints facing the combatants, as well as answers to why and where various naval archeological components of the battlefield currently reside.

Historical Sketch of Charleston

In 1670, a colonial expedition of English settlers sailed to Charleston Harbor and founded Charles Town (re-named Charleston in 1783) (Rowland et al. 1996:62; Jones 1960:80). Named in honor of the King of England, Charles II, the town developed into an entrepôt for the exploitation and exportation of natural resources, furs—primarily deerskins—and naval stores to England (Rowland et al. 1996:80). Originally settled on the west bank of the Ashley River on Albemarle Point, the town relocated in 1680 to Charleston Neck, a peninsula formed by the confluence of the Ashley and Cooper Rivers. These two rivers join to form Charleston Harbor with outlet to the Atlantic Ocean. The move was intended to expand and create shipping opportunities for the growing and prosperous colony. In the intervening years prior to the Revolutionary War, Charleston flourished as trade transitioned from a natural to an agricultural-based economy centered on indigo, sea island cotton, and rice cultivation using African slave labor. The Carolina colony, with Charleston as the epicenter, became one of the richest colonies in the British Empire as a result of the large rice plantations centered on the upper reaches of the Ashley and Cooper Rivers (Edgar

1998:139-154). The move for independence from England in 1776 brought ruin and deprivation to the port. Repelling a naval and land assault in late June 1776, American troops and militia in the city capitulated to British arms in 1780. The port languished as a trading backwater under British domination until late 1782 when Royal military forces and Loyalists surrendered and evacuated the city to American forces effectually ending the Revolutionary War in South Carolina (Edgar 1998:226-233).

Under the new Federal government, Charleston slowly recovered its preeminence as a southern trading port, relying on the exportation of rice and cotton as the mainstay of its economic vitality (Rowland et al. 1996:277). The War of 1812 temporarily disrupted shipping and economic development as British warships and privateers preyed on American shipping along the southern shores (Edgar 1998:324). Although returning to normalcy and continued prosperity after the cessation of the war, the next several decades saw the gathering clouds of discontent concerning the economic development of the city, South Carolina, and the South. Issues of great national import created heated political discourse in relation to the role of the Federal government *vis a vis* State government. The first issue centered on Federal tariffs on foreign trade, greatly impacting imports and Charleston's economic lifeblood. South Carolina passed an Ordinance of Nullification in 1832, allowing the state to override the federal tariff. In response, Federal revenue cutters and troops were deployed to collect the fees in Charleston. The predicament finally ended with a repeal of the state ordinance and revisions to the federal tariff (Edgar 1998:330-338). The next national crisis in the late 1850s and early 1860s—the question of slavery—would not end so peaceably. Led by South Carolina, a cascade of southern states drafted and enacted Ordinances of Secession from the United States in late 1860 to early 1861. These newly independent states joined to form the Confederate States of America in the beginning of 1861 (Edgar 1998:354-357). So as the first ordinance of secession was signed in Charleston, so the first shots of the American Civil War erupted from the city onto Fort Sumter.

From the initial shots upon Fort Sumter on 12 April 1861 to the evacuation of the city by Confederate forces on 17 February 1865, the port became the scene of a protracted struggle. Blockaded and assaulted by Union land and naval forces, the Confederate defenders deployed a variety of methods to keep the opposing force at bay. On land, a series of strong forts, key ones including Fort Sumter and Fort Moultrie, and earthen batteries situated at crucial points in the harbor and nearby sea islands ringed and guarded the port city from several anticipated Federal avenues of approach by land and by water. On the water, a small squadron of ironclads and other vessels, along with a series of physical obstructions, composed of log booms, ropes, pilings, and torpedoes (mines) provided a deterrent to Union warships entering the harbor. Novel vessel-types were also employed to strike at the Federal fleet stationed offshore, including *Davids*, a class of steam powered semi-submersibles, and a submarine, *H.L. Hunley*, which became the first successful combat submarine in history by sinking the USS *Housatonic* on 17 February 1864. Blockade runners through the Union gauntlet provided a tenuous lifeline with the outside world by exporting cotton in exchange for needed military supplies, as well as luxury goods (Burton 1970).

On the Union side, a large fleet stationed off Charleston Harbor maintained the blockade to prevent military necessities and commercial transactions from reaching the

South. Naval forces also engaged in offensive movements by assisting army operations in the Stono River, the backdoor to the city, and especially during the campaign for Morris Island. The highly anticipated naval assault on Charleston Harbor occurred on 7 April 1863, which was decisively repulsed by the effective concentric firing by Confederate coastal artillery. The largest contingent of ironclad vessels in the Union arsenal underscored the political importance of taking the city, oftentimes referred to as the “Cradle of Secession.” As Federal land forces aimed for the political head of the Confederacy at Richmond, the combined naval and land forces struggled to pierce the heart at Charleston. Ultimately, Confederate steadfastness and ingenuity, along with waxing and waning Union military and political objectives in regards to taking Charleston, resulted in a stalemate between the two combatants. A deadlock finally broken with the abandonment of the city in early 1865 by Confederate forces resulting from the flanking march through South Carolina by Federal forces under Major General William T. Sherman. Only then did the United States flag once again fly over the now shapeless ruin of Fort Sumter (Burton 1970).

Following the war, Charleston once again languished as a backwater port with the collapse of its agricultural mainstay—rice, once dependent on cultivation by a now freed labor source. The discovery in the late 1860s of phosphate, used as an agricultural fertilizer, in nearby rivers and land deposits stimulated the economic rebirth of the city (Shuler and Bailey 2004). Increased port activity created a need for a number of harbor improvements: dredging ship channels, removing navigational hazards—primarily Civil War-era wrecks—and the building of two stone jetties at the entrance to Charleston Harbor (City of Charleston 1883:176). A natural calamity, the Charleston Earthquake of 1886, and the subsequent Hurricane of 1893, once again threw the city into ruins. Despite the setbacks, the city recovered and by the turn-of-the century harbor improvements and better support infrastructure, along with local political maneuvering, caused the recently created navy base in Beaufort to relocate to North Charleston in 1901 (Espenshade 1995:58). The base remained an important naval asset, building many vessels during World War II, and an economic engine in Charleston until its phased closure by the Defense Base and Realignment Commission in the 1990s. Today the old base is flourishing under civilian enterprises including ship refitting and repairs, leased dock space, light industry, and home to the conservation of *H.L. Hunley* since its recovery in 2000.

Presently, Charleston is one of the busiest ports in the United States, primarily centered on container ships bringing in diverse products and goods, ROROs (Roll-on/Roll-off ships) carrying foreign cars and other vehicles and machinery, and bulk freighters carrying kaolin and other commodities. Tourism focused on the cultural and natural resources in the region provides another important economic stimulus in Charleston. Historical attractions center on the legacy of plantations, like Middleton Place and Boone Hall, and antebellum planter homes in the city, and especially important, the remains of Fort Sumter in the harbor. Natural resources attractions include seafood obtained by local watermen and by sport fishing and the low country landscape of tidal marshes, protected coastal waters, and the beaches.

Shipping and tourism play an important part in the economics and quality of life in Charleston. However, these enterprises also put pressure on the local environment which in

turn affects the archeological resources residing in and along the local waters. An increased demand for larger ships to carry more goods requires the port to accommodate these new vessels. Under the authority of the US Army Corps of Engineers-Charleston District, harbor maintenance requires constant upkeep and improvement of navigation to provide safe passage. Development of the shorelines of Sullivan's Island, Isle of Palms, and Folly Island, along with the natural tendency of the barrier islands to erode, has prompted beach renourishment using offshore sand borrow sites to protect public and private investment along the beachfront. Maintenance dredging, channel widening, and beach renourishment all have the potential to impact the cultural legacy of not only Civil War related materials but also from other historical periods. This project aims to mitigate these varied threats by accurately locating submerged cultural resources affiliated with the naval operations during the siege of Charleston. Additionally, the archeological remains, combined with historical research, will establish the core and defining features by which to delineate the boundary of the battlefield. Determining the battlefield boundaries and cultural resources will serve to guide short- and long-term management decisions affecting the integrity and preservation of this maritime battlefield.

Overview of Known and Potential Charleston Harbor Sites

Following four years of defending, blockading, and assaulting with various implements of war, both sides of the conflict left an array of cultural features on the battlefield. Unlike many battlefields that may last one day or several days leaving few traces, the siege of Charleston Harbor lasted for four years with a plethora of evidence of the intensity of the fighting. On the Confederate side, the remnants of several auxiliary steamers, such as the *Manigault* and *Etiwan*, may lie on the inner harbor floor. Several land batteries now lay inundated under harbor waters, most notably Battery Wagner and Fort Ripley. Additionally, the remains of *Sumter*, a Confederate transport steamer, may have been located between Fort Sumter and Cummings Point. Prior to the outbreak of the war, Confederate forces sank four block ships at the bar of the Main Ship Channel to prevent Federal warships and supply steamers from entering to aid in the relief of the besieged Fort Sumter. Other obstructions developed as the siege continued included a series of log booms stretching across the harbor entrance, a row of piling obstructions and several sets of frame torpedoes in various channel locations throughout the harbor. Evidence of the floating log-booms may not exist; however, piling stumps may indicate the positions of row obstructions. A number of ill-fated blockade runners, both underwater and now under the beach, rest off Fort Moultrie, as well as along the northern approach into the harbor—Maffitt's (Beach) Channel. The remains of the Confederate submarine *H.L. Hunley* once lay hidden on the bottom off Charleston Harbor near its victim, USS *Housatonic*. After its discovery (1995) and recovery (2000) the submarine now resides in a conservation tank undergoing preservation, eventually slated for display at a purpose built museum in North Charleston.

On the Federal side, a number of vessels and other remnants provide testimony to the Union attempt to take the city. In a vain attempt to close the harbor to blockade runners, twenty-nine New England vessels, mostly ex-whalers, were sunk at the two primary ship channels and quickly consumed by the shifting sediments. Three ironclads, two the victims of enemy actions (USS *Patapsco* and *Keokuk*), and the other from foundering (USS

Weehawken), rest on the harbor floor. Another remnant of the ironclad fleet, an anti-torpedo raft known as the “Devil” and used by *Weehawken*, reportedly resides in the marsh behind Morris Island. The first victim of a combat submarine, USS *Housatonic*, lies buried under several feet of overburden five miles offshore. There are also several Federal batteries, the “Swamp Angel,” with portions remaining visible in the marsh, and Battery Shaw and the Surf Battery, both of which potentially exist, but are now inundated. Research and field operations undertaken to identify these known and potential features from both sides of the conflict will develop a more complete understanding of the battlefield that will aid in the interpretation and preservation of these Civil War resources.

Physical Characteristics of Charleston Harbor

The port city of Charleston is located on Charleston Neck, a peninsula formed by the Ashley River to the west and Cooper River to the east (Figure 1). The confluence of the two rivers forms an estuary, Charleston Harbor, which is bounded by the mainland and three sea islands: James, Morris, and Sullivan’s. Inside the harbor there are several channels, Hog Island, Folly Island, and South, and shoals, namely Middle Ground, Potts, and Crab Bank. One small island lies in the harbor, Shutes Folly Island. Fort Sumter, built on a shoal, is located at the entrance channel. The main harbor channel opens into the Atlantic Ocean approximately 8 km (5 mi) from the city, although the channel extends through two jetties and terminates at the sea buoy about 37 km (23 mi) distant.

The ocean front of the Charleston vicinity is formed by several sea islands punctuated by inlets. To the immediate east of the port are Sullivan’s Island and the Isle of Palms, known as Long Island during the Civil War. These two islands are separated by Breach Inlet, and Dewees Inlet separates Isle of Palms from Dewees Island. To the immediate west of the harbor mouth is Morris Island, Folly Island, and Kiawah Island. These three islands are separated by Lighthouse Inlet and Stono Inlet. At the immediate entrance to the Stono Inlet is Cole’s Island. There are two larger interior sea islands, James Island and Johns Island, located to the southeast of the city. These interior sea islands are separated from each other towards the mainland by salt marshes and a network of reticulated marsh creeks of varying sizes. The main navigable waterways are the harbor itself, and to the south is the Stono River bounded by Johns and James Island. Wappoo Cut permits access from the Stono River to the Ashley River. The Atlantic Intracoastal Waterway transits through the harbor from the northeast behind Sullivan’s Island, through the harbor, and then westwards through Wappoo Cut to the Stono River.

During the Civil War, a large ebb-delta complex was located at the entrance to the port. The ebb-delta, or bar, extended approximately 8 km (5 mi) southwards and 4.5 km (2.8 mi) to the sea. The southerly drift was influenced by the longshore current that sweeps down the coastline from the northeast. The channels through the bar at the time included Maffitt’s/Beach Channel near Sullivan’s Island, North Channel, Swash Channel, Main Ship Channel, and Lawford Channel. Two stone jetties, completed in 1899, were built to form a new Main Ship Channel aligned directly east of the harbor throat. The resulting navigation improvement project completely altered the underwater topography of the outer and inner waters of the harbor.

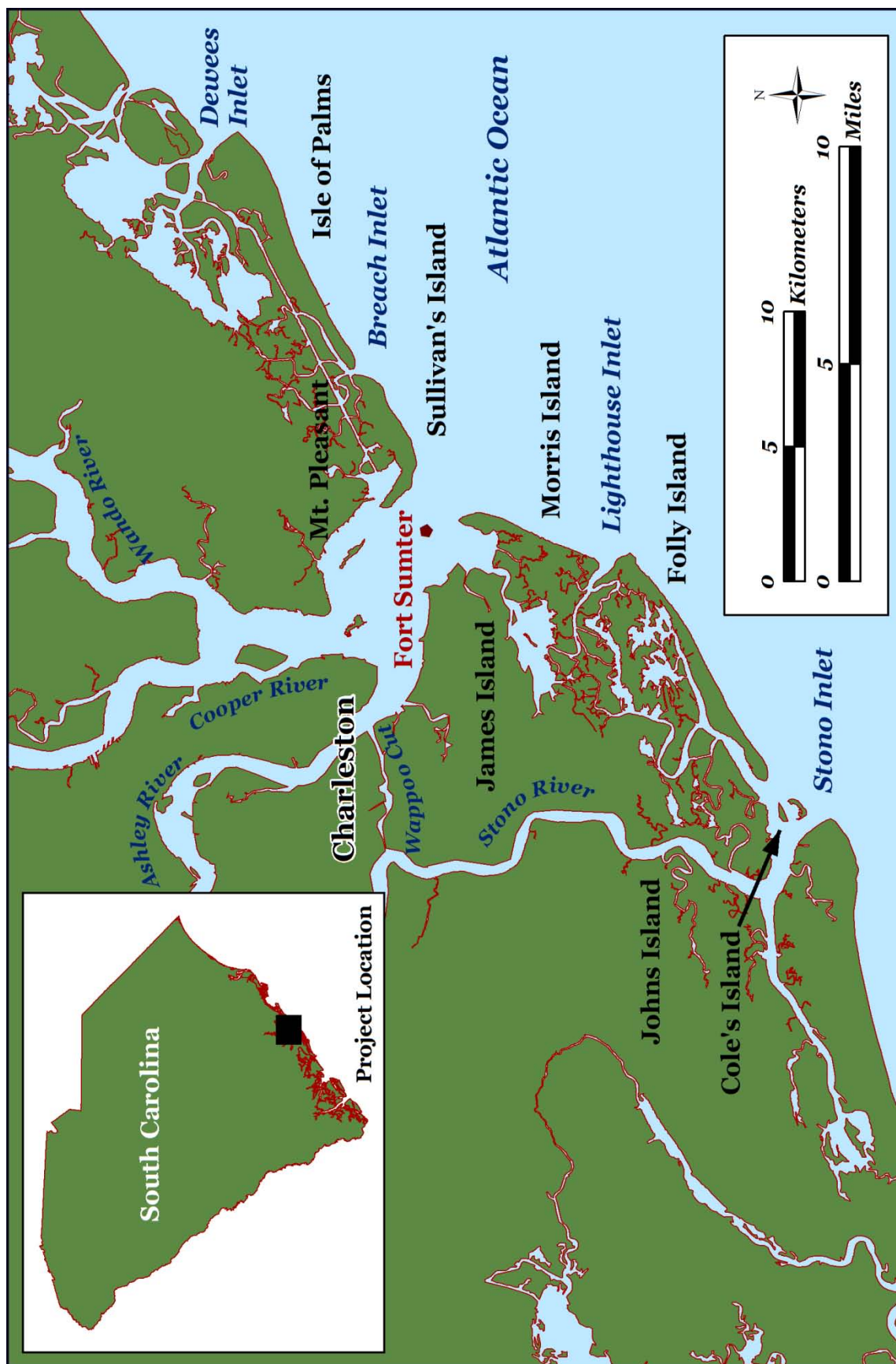


Figure 1: Charleston Harbor Naval Battlefield project location (SCIAA graphic).

A dominating physical characteristic of this part of the Atlantic Coast are the tides. Tides in Charleston Harbor range from 1.6 m (5.2 ft) to 1.9 m (6.2 ft) during spring tides, with an inequality between high and low tides of 40 cm (1.3 ft) (Fitzgerald et al. 1979:645). Average wave height is 1.3 m (4.3 ft) and about a third of the waves are greater than 1.5 (5 ft) through the year, with the greatest frequency of annual wave strengths amplified by wind in the fall coming from the northeast. During the summer and winter months the seas are from the south and southwest, while in the spring they are distributed more equally. The greatest seas and swells come from the east and northeast (Fitzgerald et al. 1979:643-644). Winds prevail from the southwest, with the next greatest frequency from the northeast, which are accompanied by high tides and heavy seas (City of Charleston 1883:495).

Report Overview

The report is divided into five chapters, including the introduction, that detail the historical, archeological, and managerial aspects undertaken to accomplish the objective of studying the Charleston Harbor Naval Battlefield. Chapter 2 narrates the history of the siege that lasted for four years and the preparations undertaken by the Confederates to hold the city and by the Union to take the city. Offensive and counter-offensive actions are treated as battle episodes that serve to illustrate the nature of the naval operations at the harbor. Chapter 3 discusses the archeological methods the MRD employed to record the various remnants of the battlefield. Previous salvage operations and archeological investigations are also explored in this chapter. Each of the archeological components investigated by the MRD is categorized by their location or affiliation on the battlefield, namely Inner Harbor Defenses, Outer Harbor Defenses, or Blockade, which is further defined as Outer or Inner. This allows for presenting the archeological features within historical context and to explain their presence on the battlefield. A detailed and individual history of the archeological remains augments the historical section in Chapter 2. Chapter 4 analyzes the battlefield using the KOCOA scheme. A discussion of the physical, cultural, and military features offers a means of interpreting the naval battlefield. The chapter closes with a description of the current condition of the battlefield. Chapter 5 offers a synopsis of the project results and findings, management issues concerning the preservation of battlefield, and recommendations to guide future management and research of the Charleston Harbor Naval Battlefield.

Chapter 2 Siege of Charleston, 1861-1865

Introduction

The siege of Charleston Harbor lasted approximately five years spanning the period from the signing of the Ordinance of Secession on 20 December 1860 to the city's evacuation by Confederate forces on 17 February 1865. During that time Charleston transformed from a Southern seaport into one, if not, the most heavily fortified city in the world. Confederate and Federal engineers designed and deployed a variety of land and sea contrivances in their struggle to hold and to assault the harbor. Commencing with the standard mode of warfare fought with brick forts and wooden sailing and steam vessels, military engineers on both sides of the conflict quickly developed innovative combat instruments including ironclads, torpedoes (mines), semi-submersibles, and submarines. Many of these instruments of war, and strategies to cope with them, left their mark on the naval battlefield of Charleston Harbor. The next chapter discusses the archeological vestiges of these implements of war investigated during the course of the fieldwork portion of the ABPP grant.

The purpose of this chapter is two-fold: one, to provide the context of the basic strategy and weaponry used by Confederate and Union forces, and two, to examine the naval attacks and counter-attacks to take and to hold Charleston Harbor. Confederate and Union strategies, weaponry, and political and military concerns serve as a backdrop to place the naval battle sequences discussed later in this chapter within the larger historical context. Acknowledging that important military activities occurred on the west flank of the Confederate defenses along the Stono River, including the Battle of Secessionville on 16 June 1862 and other skirmishes on James Island, this section will focus on the Union and Confederate naval and combined operations at the entrance to Charleston Harbor. This historical sketch will serve as the foundation for analyzing the natural, cultural, military, and archeological features of the naval battlefield discussed in Chapters 3 and 4.

Multiple research sources were consulted to construct the historical narrative of the naval battlefield at Charleston Harbor from 1861 to 1865. The two primary reference sources utilized were the *Official Records of the Union and Confederate Navies in the War of the Rebellion* (ORN) and *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies* (ORA). These two sources in multiple volumes contain official reports, orders, after-action reports, illustrations, and correspondence related to the naval and army activity during the Civil War of which those relating to Charleston Harbor were gleaned. Another important source of material was the published personal recollections of the officers, soldiers, and sailors that participated in the actions around Charleston Harbor. Articles from Northern and Southern newspapers, including *Harper's Weekly*, *New York Times*, and *Charleston Mercury* provided another source of significant eyewitness accounts, reports, and illustrations. Archival research of unpublished reports, letters, maps, drawings, and photographs at the National Archives I and II in Washington, DC, and College Park,

MD, the Library of Congress, the South Carolina Historical Society in Charleston, and at the University of South Carolina in Columbia, provided a wealth of detail on the events surrounding the siege of Charleston. An important research tool was the Internet that tapped a plethora of online digital documents, drawings, paintings, and photographs from a variety of archival repositories and historical organizations.

Secondary sources referenced for this report included *The Siege of Charleston, 1861-1865* by E. Milby Burton that recounts the land and sea components of the battlefield. *Success Is All That Was Expected* by Robert M. Browning, Jr. discusses the responsibility of the South Atlantic Blockading Squadron and operations around Charleston Harbor. *Gate of Hell: Campaign for Charleston Harbor, 1863* describes the army and navy attempts to take Charleston Harbor via Morris Island. *Lifeline of the Confederacy* details the actions of the blockade runners. Both of these historical works are by Stephen R. Wise. These four sources provided a thorough understanding of the events surrounding the Confederate and Union actions during the siege. For a more general history of the port and South Carolina *Charleston's Maritime Heritage, 1670-1865: An Illustrated History* by P. Coker, III and Walter Edgar's *South Carolina, A History* described the development of the state and Charleston.

Defenses of Charleston Harbor after Secession of South Carolina

At the time of the signing of the Ordinance of Secession on 20 December 1860 in Charleston by South Carolinian legislators, the city and harbor were ill-prepared for war. Existing Federal military installations at this time included Fort Sumter, Fort Moultrie, and Castle Pinckney. Fort Sumter was built at the entrance to the harbor on a shoal and enhanced with a foundation of large blocks of stone. Begun in 1829, and still unfinished after 30 years, the polygonal structure, made of brick walls with two tiers of guns in casemates and one in barbette, stood 60 feet above the harbor waters. The fort was situated at the edge and narrowest part of the harbor channel between Fort Moultrie and Cummings Point. This was the strongest defensive structure in the harbor commanding the channel into the harbor, the nearby sea islands, and the city (Doubleday 1876:35; Burton 1970:5). Fort Moultrie, located on Sullivan's Island and built on the site of the earthwork of Revolutionary War fame and subsequent configurations, was a brick structure with 12-foot-high walls built in 1809. The two fortifications partnered to guard the main channel passing between the two forts and into the inner harbor (Doubleday 1876:15). Another masonry fortification, Castle Pinckney, built in the early 19th century, was situated on Shute's Folly Island at the mouth of the Cooper River and protected the city and port. On the northeastern tip of James Island were the abandoned ruins of the Revolutionary War fortification, Fort Johnson, which overlooked the harbor and the city. The Arsenal, located on the Ashley River side of the city, stored a quantity of Federal military supplies (Burton 1970:6).

Fort Sumter Crises

As the rhetoric in South Carolina and Charleston escalated in fervor against the Federal government, Major Robert Anderson, in command of Federal forces in Charleston,

moved his command from Fort Moultrie to Fort Sumter on the night of 26 December 1860. This action precipitated a series of seizures of Federal installations and property in Charleston by South Carolinian forces. Castle Pinckney and Fort Moultrie were occupied the next day, on the 27th, and the Arsenal on the 30th by troops under order of the newly elected South Carolina governor, Francis Pickens (Burton 1970:14-16). Previous to Abraham Lincoln's election as President of the United States, then current South Carolina Governor William Gist had declared upon secession that any hesitation in turning over Federal properties in the state would result in an immediate assault (Doubleday 1876:44). The refusal by Anderson to Governor Pickens to retire from Fort Sumter provoked the South Carolinians and then the newly formed Confederate States of America to begin preparations to force the issue. Two developmental phases to improve the harbor defenses now commenced. The first phase was under direction of the South Carolina government and centered on taking Fort Sumter. This period spanned from before Anderson's move to Fort Sumter on 26 December 1860 until the Confederate States of America assumed control of harbor defenses on 1 March 1861. During this phase the first shots of rebellion from the South fell upon *Star of the West*, a merchant steamer contracted and manned by the US government to provide relief to Fort Sumter. The second phase under the Confederates evolved from solely focusing on Fort Sumter to defending Charleston from Federal military assaults by land and sea. This period in developing the harbor defenses lasted until the abandonment of Charleston by Confederate forces on 18 February 1865.

South Carolina Preparations in the Harbor

Prior to the Federal troop's removal to Fort Sumter in late December 1860, South Carolina military authorities had commenced preparing for an assault on Fort Moultrie. Initial work began on 11 December to secretly build several batteries at Mount Pleasant and at the upper end of Sullivan's Island, along with infantry entrenchments. The battery at Sullivan's Island was designed to guard the channel and to prevent the passage of vessels loaded with supplies and reinforcements. Discovery of these preparations and intentions had precipitated Anderson's decision to remove his command from Fort Moultrie to Fort Sumter which offered better defensive qualities (Doubleday 1876:44, 48). In early January 1861, Fort Johnson had a three-gun battery built, and a large part of Fort Moultrie and Castle Pinckney were faced with huge piles of sandbags (*ORA*, ser. 1, vol. 1:4; Doubleday 1876:106). By late January, a battery was also built on the Stono River to guard the mouth and potential entrance to Charleston Harbor through Wappoo Cut (*ORA*, ser. 1, vol. 1:146-148).

On the same day construction of the Sullivan's Island batteries began, Governor Pickens ordered the sinking of four hulks to block the main channels leading into the harbor, except at Maffitt's/Beach Channel adjacent to Sullivan's Island. These hulks were from Savannah and loaded with granite. The hulks eventually disintegrated though the actions of tides and waves and apparently posed some inconvenience to navigation (Doubleday 1876:108; Burton 1970:22). According to Captain John Foster in Fort Sumter, the hulks were only sunk in one place, "The Main Ship Channel is so much obstructed by the four hulks that they sunk...[on] the 11th find the greatest difficulty in getting out or in, even with the harbor pilots, who know their position exactly" (*ORA*, ser. 1, vol. 1:138-139). Reports of

the sinking of the hulks and the threat of war forced the merchant trade to Savannah, causing Charleston citizens to understand "...the kindness of the people of Savannah in furnishing them with old hulks to destroy the harbor of Charleston" (Doubleday 1876:125).

On the day Federal land installations were seized by the state, the United States revenue-cutter *William Aiken* was turned over by its pro-Southern captain to South Carolina authorities. The 80-ton fore-and-aft schooner had an armament of one 12-pounder brass howitzer amidships and a quantity of rifles (*New York Times* 9 January 1861). The vessel was then anchored near Fort Sumter to oversee Federal movements in the fort and overhaul passing vessels entering the harbor (Doubleday 1876:81, 140). Another Federal vessel, *Firefly*, associated with the US Coast Survey was also seized (*Report of Coast Survey of 1863*:44). A merchant steamer, *Marion*, regularly plying between New York and Charleston, was commandeered by state authorities for use as a warship but later returned to its Northern owners along with the Federal troops from Fort Sumter (Burton 1970:25). The first war vessel outfitted since the War of Independence by South Carolina was purchased by Governor Pickens in Richmond. The steam iron propeller, *James Gray*, 161 tons and built in Philadelphia in 1858, arrived in Charleston on 15 January 1861 and was renamed *Lady Davis* in honor of the first lady of the Confederate States, Varina Davis. The vessel was armed with a pair of 24-pounders and altered for naval purposes and started service on 13 March. From 1861 to 1863 the gunboat served as a harbor patrol and transport vessel. In 1863, the vessel's armament and machinery was transferred to another gunboat and subsequently abandoned in the harbor (*The Charleston Mercury* 14 March 1861; *Harper's Weekly* 18 May 1861:311; *The Charleston Daily News* 24 August 1871; Lytle and Mitchell 1975:108). Several small steamers, including one called *Niña*, patrolled and ferried supplies and men about the harbor (Doubleday 1876:50; 67-68).

President James Buchanan and his cabinet decided to send a merchant steamer, *Star of the West*, laden with troops and supplies to Fort Sumter. Receiving notice on 31 December that a steamer was bound for Charleston, cadets from the Citadel Academy were rushed to Morris Island to erect a battery to command the Main Ship Channel (Doubleday 1876:94). On the parapet of Fort Sumter the morning of 9 January 1861, Captain Abner Doubleday spied a vessel flying the American flag steam over the bar and enter the Main Ship Channel. Approaching the newly constructed battery, a shot was fired at the steamer which quickly passed the fortification. Anderson ordered the parapet guns manned but withheld fire on the Confederate batteries during the incident. Fort Moultrie then fired upon the merchant vessel, and a harbor steamer towing the *William Aiken* made for the Union vessel. The captain of *Star of the West*, finding no assistance from Fort Sumter, struck once, approaching hostile vessels, and unarmed, ordered the steamer to double-back through the channel. The steamer received another round of salvos from the Citadel battery until the shots fell short. The steamer safely returned to New York (Doubleday 1876:103-104; *ORA*, ser. 1, vol. 1:10; *Harper's Weekly* 26 January 1861:54).

Confederate Preparations in the Harbor

Following the creation of the Confederate States of America on 8 February 1861, Jefferson Davis, the newly appointed president, ordered Major William H. C. Whiting to

proceed to Charleston in late February to inspect the posts in Charleston Harbor and to bear in mind "... the double relation they may have as works of offense and of defense" (*ORA*, ser. 1, vol. 1:258). Whiting reported that the South Carolinians had directed too much of their efforts towards taking Fort Sumter and not enough attention to defending the harbor to prevent Federal reinforcements (*ORA*, ser. 1, vol. 1:258-259). On 1 March 1861 Davis appointed Brigadier General Pierre G. T. Beauregard to command all Confederate forces in South Carolina (*ORA*, ser., 1, vol. 1:259-260).

Upon his arrival in Charleston, Beauregard immediately inspected the harbor defenses prepared by the South Carolina military. Beauregard believed that with the proper forces and resources Fort Sumter was a virtual Gibraltar, but the weakness was the garrison and his first priority was to prevent reinforcements to replenish its troops and supplies. On Morris Island overlooking the Main Ship Channel, he ordered the construction of a number of sand batteries approximately 100 yards apart, as terrain permitted, distributed to lessen the effects of the broadsides of a vessel from disabling them. An ironclad battery called the Steven's or Iron Battery which was at Cummings Point had been previously sited on the island by SC troops but was completed during the CSA tenure. The battery was created of a sloping angle approximately 40 degrees and built of large pine timbers faced with railroad iron and flanked by sandbags and armed with three 8-inch Columbiads. Levered iron shutters closed the gun ports while reloading the guns (*ORA*, ser. 1, vol. 1:191; Doubleday 1876:117; Sharf 1887:657; Hagood 1910:36; *The Charleston Mercury* 15 April 1861). On Sullivan's Island, additional guns were ordered for a battery guarding Maffitt's/Beach Channel. Beauregard also attended to strengthening the fortifications aimed at Fort Sumter on Sullivan's Island and Fort Johnson (*ORA*, ser. 1, vol. 1:25-27). In mid-March, a Charleston newspaper reported the condition of the harbor defenses as consisting of a series of batteries with heavy ordnance along Morris Island that command the Main Ship Channel, making the passage of hostile vessels a hopeless task. On the other side of the harbor entrance on Sullivan's Island, besides the guns of Fort Moultrie, several batteries guarded Maffitt's Channel at short range, rendering access to hostile vessels equally unrealistic (*The Charleston Mercury* 14 March 1861).

As the land defenses were strengthened, a floating battery was also under construction. Started with the approval of the state, Beauregard supported the continued efforts to build the novel instrument of war (Beauregard 1879:522-523). The floating battery resembled a large barn on a raft measuring 100 feet long and 25 feet wide with a reported draft of 7 feet. A large shield was constructed of heart pine logs squared 12 by 12 inches buttressed by palmetto logs and plated with four courses of boiler iron under two courses of railroad strap-iron (Sharf 1887:657-658). Armament consisted of four guns: two 42-pounders and two 32-pounders (*The Charleston Mercury* 2 May 1861). The weight of the guns and iron plating of the shield required a counter-weight of sandbags to counteract the tendency to tip (*ORA*, ser. 1, vol. 1:190). On the evening of 14 March, one gun was fired from the floating battery to indicate the battery had been placed on board (*ORA*, ser. 1, vol. 1:205). The battery was finished by mid-March 1861 and received orders from Beauregard to proceed to the Stono River (*The New York Times* 20 March 1861). An artillery company of 74 men were deployed on the floating battery (*ORA*, ser. 1, vol. 1:262-263). The battery lay for sometime in view of Fort Sumter, but on the night of 27 March disappeared from their

view, and based on newspaper accounts, the Federal troops in the fort believed it was moved to the Stono River or perhaps to Lighthouse Creek to lay closer to Fort Sumter (*ORA*, ser. 1, vol. 1:224, 227). The floating battery reappeared off the west end of Sullivan's Island on the morning of 11 April. The battery was situated to dispense a fire on the left flank and to prevent any vessel from laying alongside the left flank of Fort Sumter (*ORA*, ser. 1, vol. 1:250).

President Abraham Lincoln felt that the political situation demanded an attempt to provide supplies to the garrison in Fort Sumter despite the slight military prospects of success, and going against the judgments of some to the futility of the endeavor. On 29 March 1861, Lincoln ordered Secretary of the Navy Gideon Welles, in cooperation with the Secretary of War Simon Cameron, to prepare a relief expedition to depart as early as 6 April. Steamers *USS Powhatan* and *USS Pocahontas*, revenue cutter *Harriet Lane*, and a private merchant vessel, *Baltic*, along with three hundred seamen and two hundred soldiers, were to carry one year's supplies in portable form to replenish the fort's stores. The expedition was under the command of Gustavus V. Fox, a private citizen of Massachusetts and a former Navy officer, who later became the Assistant Secretary of the Navy during the war (*ORA*, ser. 1, vol. 1:226-227; Welles 1870:619-620). According to Fox, his plan centered on the fleet entering the harbor through the Swash Channel with 9 feet of water, which was a more direct route to Fort Sumter, rather than entering through the Main Ship Channel, which caused a vessel to enter bows on to Moultrie, essentially providing a fixed target. The Federal fleet would attempt to make their move into the harbor during the dark. Fox hoped to run the steamers at a right angle to enemy fire and one thousand yards distant, a feat accomplished during the Crimean War (Fox 1870:254-256).

Confederate forces began exposing and moving into place various batteries from which to force the Federal troops out of Fort Sumter. Anderson in Fort Sumter reported on 11 April "that everything around us shows that these people are expecting the arrival of a hostile force, and they are making most judicious arrangements to prevent the landing of any supplies at this fort" (*ORA*, ser. 1, vol. 1:250). Previous to that date, on 8 April, a four-gun battery on the upper end of Sullivan's Island was unmasked by blowing up the wooden house standing in front of it. On 10 April a second battery of one gun was unmasked on Sullivan's Island, nearer the western point of the island. On 11 April, the defenders of Fort Sumter noted the presence of the floating battery on the upper end of Sullivan's Island, aground and behind the breakwater, now transformed into a fixed battery. The position gave the battery a sweep of the left flank of the fort and rendered it impossible for any vessel with supplies to lie anywhere along this flank, while the breakwater in front protected it from ricochet shots (*ORA*, ser. 1, vol. 1:16-17).

In April 1861, the CS Navy in Charleston Harbor consisted of several armed steamers under the command of Captain Henry Hartstene. In anticipation of another Federal effort to support the garrison at Fort Sumter, the CSN ships guarded Maffitt's/Beach Channel along Sullivan's Island and off the bar at the Main Ship Channel. They also cruised between Bull's Bay to the north and to the Stono River Inlet to the south. A small boat was also ordered to cruise between the two channel stations. Their orders were to inspect every vessel entering the harbor and to prevent reinforcements to Fort Sumter (Sharf 1887:658). During this

period a merchant schooner, *Rhoda H. Shannon* from Boston, loaded with ice and bound for Savannah, mistook Charleston Bar for Tybee Island during rough weather and signaled for a pilot boat by hoisting the US flag. This was regarded as direct defiance, and a heavy cannonade from a Morris Island battery and Fort Moultrie was at once opened on the vessel. Finally, the schooner moved out through the Swash Channel and anchored, resuming its journey to Savannah the next day. Fort Sumter had manned the guns but again Anderson refused to fire on the Confederate batteries (*ORA*, ser. 1, vol. 1:237; Doubleday 1876:136; *The Charleston Mercury* 6 April 1861).

By 11 April, Beauregard reported all batteries and channel defenses were complete for the reduction of Fort Sumter. Following the communication from the president of the United States to the governor of South Carolina announcing the preparation of a Federal relief expedition to Fort Sumter, Beauregard felt compelled to speed up the reduction of the fort to prevent coordination between the fleet and the fort. Authorized by the Confederate Secretary of War LeRoy P. Walker to “. . . reduce the fort as your judgment decides to be most practicable” Beauregard notified Anderson at 3:20 AM on 12 April that firing on the fort would commence in one hour (*ORA*, ser. 1, vol. 1:30-35). On the evening of 11 April *General Clinch* and *Seabrook* fitted with 12-pound howitzers were sent out to prevent the Federal fleet reinforcing Fort Sumter. The flotilla remained cruising just inside the bar and observed the gathering Federal fleet offshore. Several hulks were also anchored at the harbor entrance, intended as fires ships to signal an attempt by the Federal fleet to force an entrance (*The Charleston Mercury* 15 April 1861; Scharf 1894:659). Anderson and his staff refused to surrender the fort. At 4:30 AM a signal shell launched from Fort Johnson indicated the order to commence firing on Fort Sumter. Subsequently, the Morris Island and James Island batteries and the Floating Battery, totaling 30 guns and 17 mortars, opened fire on Fort Sumter. Fort Sumter, armed with 48 guns, did not respond until 7 AM (*ORA*, ser. 1, vol. 1:18-19; 31).

The long anticipated Federal relief expedition started to rendezvous off Charleston in the early morning of 12 April. The merchant vessel *Baltic* arrived off Charleston at 3 AM to find *Harriet Lane*. Both of these vessels witnessed the opening bombardment of Fort Sumter an hour later. USS *Pawnee* arrived at 7 AM and USS *Pocahontas* not until the afternoon of 13 April, and USS *Powhatan*, the chief fighting platform to relieve Fort Sumter in Fox's scheme, and unknown to him, had been ordered instead to relieve Fort Pickens in Pensacola, Florida. Heavy seas and a gale buffeted the small fleet which included several merchant vessels bound for Charleston, which gave the appearance of a large fleet off the bar. Despite talk of forcing an entrance into the harbor, the fleet remained anchored until Anderson surrendered Fort Sumter on 13 April and then assisted in bringing the garrison back North (*ORA*, ser. 1, vol. 1:11; Fox 1870:258-259).

During the bombardment, approximately 3,341 shot and shell had been fired by the Confederates into Fort Sumter (*The Charleston Mercury* 3 June 1861). The floating battery fired approximately 247 shot from 42-pounders and 228 shot from 32-pounders at the fort (*ORA*, ser. 1, vol. 1:43). The upper story at the parapet suffered the greatest damage with the lower casemates hardly affected. A shell from a Blakely gun at Cummings Point penetrated clear through the fort (Doubleday 1876:152, 155, 167). On 13 April, the most serious

damage the fort experienced was when the wooden barracks caught fire endangering the magazines (*ORA*, ser. 1, vol. 1:22). According to Doubleday “They had a great advantage over us, as their fire was concentrated on the fort, which was in the centre of the circle, while ours was diffused over the circumference” (Doubleday 1876:155). Approximately two years later, a Federal naval ironclad assault fleet would find themselves in the same situation, albeit with Fort Sumter’s firepower added to the concentration.

The Federal fire was ineffective for the most part, a result of insufficient caliber for the ranges, and consequently did little damage to the Confederate batteries. The balls bounded off the ironclad battery at Cummings Point, although did damage one of the shutters; the floating battery was struck repeatedly, with one round penetrating at the angle between the front and roof. The rest of the 32-pounder balls were deflected and failed to penetrate the front or the roof. Shots or shells could not strike below the water line on account of the sea wall behind which the battery had been grounded (Hagood 1910:36; *ORA*, ser. 1, vol. 1:20-21, 44). Fort Moultrie experienced some damage during the gunfight, where one gun was disabled, the barracks riddled, and several embrasures injured (Doubleday 1876:168; *ORA*, ser. 1, vol. 1:19). A few shot were directed at the ex-revenue schooner *William Aiken*, observed lying at anchor between Sullivan's Island and Mount Pleasant, causing the vessel to hoist anchor and set sail out of range of the fort’s guns. Several rounds were fired at the hulks anchored in the channel on a line between Cummings Point and Fort Moultrie (*ORA*, ser. 1, vol. 1:19-20).

After 1 PM on 13 April, enduring 33 hours of bombardment, with the fort ablaze Anderson having done his duty, surrendered Fort Sumter to Confederate forces. The next day the garrison was transferred to *Baltic* and returned to New York (*ORA*, ser. 1, vol. 1:23-24). Welles remarked later that the failed expedition to Charleston Harbor to provide relief to Anderson in Fort Sumter “was forcibly resisted by the insurgents in Charleston, who then and there placed themselves in open, defiant rebellion, fired the first gun, committed the first act of war, and commenced the first assault on the flag, the troops, and a national fortress” (Welles 1870:637). Fort Sumter and all harbor defenses were now in possession of the CSA. Now efforts directed towards harbor defenses were made to keep another Federal fleet out—the retaliatory one.

Confederate Preparations for Federal Assault

From the fall of Fort Sumter on 13 April 1861 to the abandonment of Charleston on 18 February 1865, there were four Confederate commanders responsible for the defenses of the harbor: Brigadier General Beauregard (1 March 1861 to 1 June 1861, and 29 August 1862 to 19 April 1864), General Robert E. Lee (November 1861 to 14 March 1862), Major General John Pemberton (14 March 1862 to 29 August 1862), and Major General Samuel Jones (19 April 1864 to 18 February 1865). According to Confederate Brigadier General Johnson Hagood the first three commander’s accomplishments varied: Lee’s achievements were imperfect, Pemberton’s were limited, and not until Beauregard’s second arrival did the defenses of Charleston reach a state of excellence (Johnson 1890:39). The conditions of the defenses around the city and the harbor evolved during the months and years, as repairs and improvements to the fortifications, changes in armaments, naval construction, and

experiments with harbor obstructions kept the Confederate forces occupied on preventing a Federal incursion (Johnson 1890:29). The ensuing section outlines the general development of defenses of Charleston and then focuses topically on several important features of the Confederate naval defenses, namely obstructions, torpedoes, and warships.

Beauregard, immediately after the fall of Fort Sumter, ordered repairs to the fort (Roman 1884:50). Additionally, a number of the batteries bearing on the Main Ship Channel on Morris Island and Fort Sumter were demolished (Hagood 1910:35). Another fortification to prevent turning the defenses of Charleston was built on Battery Island, actually the lower southwest extremity of James Island on the Stono River, by May 1861. Other defensive structures were also built at various points along the South Carolina coast (Roman 1884:51-52). At the end of May, Beauregard was ordered to Richmond, Virginia, the new capital of the CSA, for command of the Confederate defenses at Manassas (Roman 1884:67).

General Robert E. Lee arrived in Charleston in early November 1861 shortly after the successful Federal naval attack at Port Royal. Immediately after the reduction of the Port Royal defenses on 7 November by Federal military forces, the Confederates withdrew their works from the outer beaches of the islands lining the coast to the mainland. All seacoast or island positions south of Cole's Island, at the entrance to the Stono River, were dismantled and abandoned. The new line of defense south of Charleston ran from Cole's Island southwardly along the eastern bank of the Stono River then along the mainland to the Savannah River (Hagood 1910:53). Lee found the land defenses of Charleston consisting of a series of fortifications from the coast side of James Island, extending to Wappoo Cut, then to the Ashley River, and across the neck between the Ashley and Cooper Rivers at the north side of the city. Most of these works were still under construction but were near completion. The batteries in the harbor were in good condition, and Lee believed if they were properly worked could arrest an approach into the harbor (*ORA*, ser. 1, vol. 4:346-347; Long 1886:138). Lee anticipated a large military attack on Charleston, and suggested several defensive arrangements, including maintaining the Charleston and Savannah Rail Road to move troops in front of the enemy, and was in favor of "... abandoning all exposed points as far as possible from reach of the enemy's fleet of gunboats and of taking interior positions, where we can meet on more equal terms" (*ORA*, ser. 1, vol. 4:394). Again Lee reiterated his thoughts on the Federal gunboats versus Confederate land defensive works:

Wherever his fleet can be brought no opposition to his landing can be made except within range of our fixed batteries. We have nothing to oppose its heavy guns, which sweep over the low banks of this country with irresistible force. The farther he can be withdrawn from his floating batteries the weaker he will become, and lines of defense, covering objects of attack, have been selected with this view (*ORA*, ser. 1, vol. 4:367).

Major General John Pemberton succeeded Lee in March 1862 and continued strengthening the harbor defenses, most notably ordering the construction of Battery Wagner on Morris Island and the Middle Ground Battery in the harbor. Pemberton, however, angered state officials when he ordered the abandonment of the earthworks located on Cole's Island, commanding Stono Inlet, and those at Battery Island, felt by many to be the lynchpin

of the Charleston defenses. The Stono batteries were originally situated by Brigadier General Beauregard just before the attack on Fort Sumter in 1861 to prevent reinforcements from reaching the fort in small boats (Hagood 1910:56). Pemberton, and Lee before him, did not agree with the placement of the batteries on the island. The withdrawal was precipitated by the success of the Confederate ironclad *Merrimac* in silencing the Federal batteries at Newport News, Virginia in 1862. Many Confederate military engineers considered that earthworks could not withstand these new types of naval warships, and to eliminate any defensive weakness within reach of these ships, Pemberton ordered the defenses of Cole's and Battery Islands dismantled in April 1862 (Hagood 1910:56-62; *ORA*, ser. 1, vol. 6:420). Governor Pickens pleaded with Lee, back in Richmond, to countermand the order, but was told Pemberton made the final decision. The batteries were not dismantled until late May, which allowed time for strengthening other Confederate positions closer to Charleston (*ORA*, ser. 1, vol. 6:423-424, 427, 429-430).

During the process of evacuating the Cole's Island battery to Fort Ripley, a Confederate transport steamer *Planter*, used in withdrawing the ordnance and other supplies, was commandeered by its slave crew and brought out of the harbor and handed over to the offshore Federal blockaders on 13 April 1862. Besides bringing four large guns originally destined for Fort Ripley, the contrabands delivered information about the abandonment of the Confederate defenses at Stono Inlet. This set in motion Federal plans to make an advance on Charleston via the Stono River. The first US Navy gunboats appeared off Stono Inlet on 20 May, and promptly bombarded Cole's Island. A Confederate picket set fire to the remaining buildings and withdrew from the island. The gunboats moved upriver and fired on the Battery Island works (*ORA*, ser. 1, vol. 14:16; *The Charleston Mercury* 21 May 1862). The loss of the Stono River and Inlet was blamed entirely on Pemberton and eventually forced his removal to a new department.

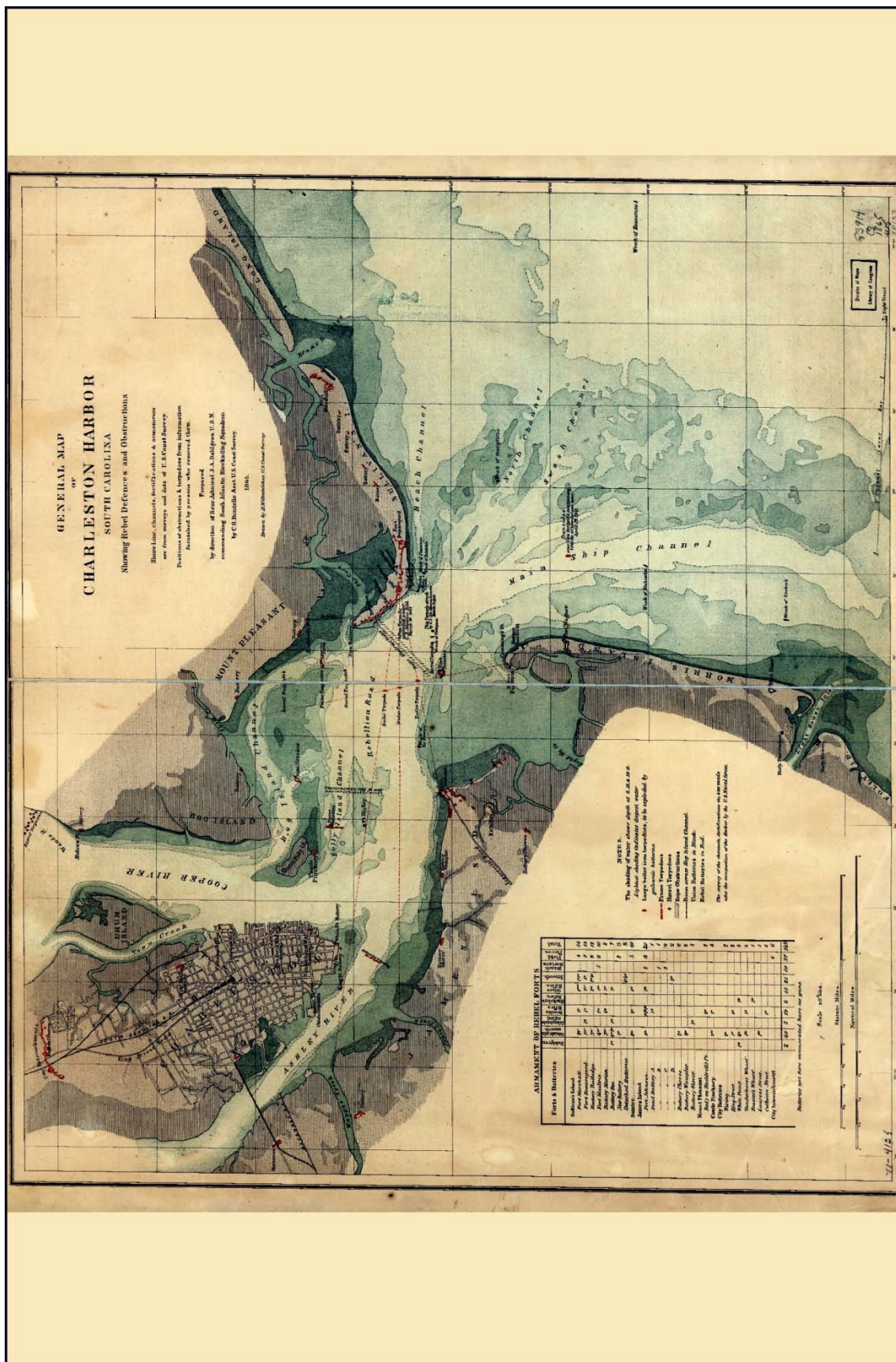
Federal forces continued their build-up on James Island until checked at the Battle of Secessionville on 16 June 1862. But the chink in the Confederate defenses remained. The Stono Inlet and River was the *point d'appui* of all Federal operations against Charleston. Confederate Brigadier General Johnson Hagood stated after the war regarding Pemberton's decision to vacate Cole's Island "There can be no doubt of the error of the movement in the light of the subsequent events of the war" (Hagood 1910:60-61). Union Brigadier General Quincy Gillmore, the beneficiary of the withdrawal, stated in 1864 that it certainly was an error by the Confederates to abandon Cole's Island, for it permitted the occupation of Folly Island, ceded control of Stono Inlet, and provided a secure base to threaten Charleston (Gillmore 1864:125).

Beauregard returned to Charleston in September 1862, after service in Virginia and in the west, and served during the most active period of the siege fending off several Federal land and naval operations to ingress the harbor. Upon his return, Beauregard articulated his thoughts on the potential avenues of approach the Federals would take to attack Charleston. He believed there were five different routes of varying practicality in assaulting the city and harbor. The first avenue of approach was by way of landing forces at Bull's Bay, north of the city, marching overland to Mt. Pleasant and then seizing the northern inner harbor. Second, land a force to the south and attack the Charleston and Savannah Railroad and

approach the city from the rear. Beauregard deemed these two routes impractical, mainly because the Federal land forces would lose cooperation with the gunboats. This second route, however, was half-heartedly attempted on several occasions by Federal forces at Port Royal Sound, with a series of feints throughout the war in attempts to draw Confederate forces from Charleston (*ORA*, ser. 1, vol. 14:178-179). Only the last three approaches: James Island, Sullivan's Island, and Morris Island permitted close cooperation with army and navy gunboats, and thus the more likely avenues of attack. Of the three routes posited by Beauregard, James Island was believed the most dangerous route requiring a stout Confederate defense to protect the rear of the city and inner harbor; Sullivan's Island the next critical route that could force the surrender of Fort Sumter and control of the harbor; and Morris Island offering the slightest risk to the city. Beauregard felt a Federal invasion via the Morris Island route was the least deleterious to the defense of the city because of the distance of the island from Charleston and Fort Sumter, and did not relinquish control of the harbor (Hagood 1910:131-132). Subsequent events would prove Beauregard's assessment correct regarding the failure of the Federal avenue of approach via Morris Island to force the surrender of Fort Sumter and the city to capitulate.

Already familiar with the Charleston defenses, Beauregard determined the city was in a bad defensive state against a resolute attack. While the main works on Sullivan's Island, i.e., Fort Moultrie, and associated batteries were in good condition, other works in the harbor, including Fort Sumter, were inadequately armed. He found at Fort Sumter several 8-inch and three 10-inch Columbiads, a number of 32-pounders prone to burst, and a few good 42-pounders. Beauregard had these guns rifled and banded to improve their accuracy and safety. Beauregard devoted his efforts in perfecting the defenses, especially those related to the inner harbor from his arrival until departing later in 1864. Regarding the harbor defenses, he commented "I place great reliance, however, on three things--heavy guns, Rains torpedoes, and, in deep water, rope obstructions" (Beauregard 1878:514; Hagood 1910:131-132; *ORA*, ser. 1, vol. 14:917-918). And as a private citizen wrote to his wife in April 1863, "The city and harbor are strongly defended and everything that could be done by fortifications, torpedoes and obstructions has been done" and later in the year, "The city is also fortified and daily becoming stronger, and we intend to die hard" (SCHS-Burckmeyer).

A map drawn by Federal forces after Confederate forces abandoned the city in February 1865 illustrated the culmination of the various land and water defensive structures Beauregard and the other commanders developed to keep Federal land and naval forces at bay. The map graphically displays the military preparations undertaken by the Confederates and the ways in which they envisioned defending themselves from naval attack. The manner in which the various naval avenues of approach were defended in harmony with the harbor's natural and cultural environment will be discussed more fully in Chapter 4. The map is also a reference to the following section that describes the defensive means employed by the Confederates in the harbor until February 1865 (Figure 2). The discussion in regards to the harbor defenses is in relation to their disposition on the battlefield, namely City, Inner Harbor, Outer Harbor defenses, harbor obstructions, and naval assets.



City Defenses

Several earthworks were built along the waterfront and neck to create a defensive halo around the city. These defenses were sited to protect the city primarily from naval assault, although the neck entrenchments protected the back door from a land attack. On the Ashley River side of the city two batteries protected the bridge connecting the city to the mainland on the west, and swept the entrance to Ashley River. Moving round to the tip of the peninsula two batteries commanded the inner harbor and approach to the city. Several batteries north along the Cooper River protected against naval forces moving upriver, as well as any attack by land forces on the Mt. Pleasant side of the harbor. The Neck, or City Entrenchments, protected against any land assault from the north. A Confederate soldier stationed at these entrenchments in 1862 noted:

These breastworks were built to keep any enemy out of the city, but the nearest enemy on land at that period was on Folley [sic] Island; in Tennessee to the west; and Virginia to the North. And when Sherman did come within 50 miles of Charleston nearly three years later our troops were too much occupied in getting away to think of these breastworks (Ford 1905:13).

Other security measures included designating selected points of the harbor for the departure of small boats and military steamers from the city. Sentinels also patrolled the entire peninsula along the river and at the neck. Guard rowboats from sunset to sunrise patrolled both rivers about 300 yards from the city (Hagood 1910:75, 80).

Large guns of various makes and sizes were used to arm the city batteries, these included Dahlgrens, smoothbore Columbiads, Blakely, and Brookes rifles. Those at the city entrenchments were field artillery pieces. Two enormous 13 ¼-inch caliber Blakely cannons, about five feet in diameter between the trunnions, were received from England by a blockade runner. The shell projectiles weighed about three hundred and fifty pounds, and the solid cylindrical shots weighed seven hundred and thirty pounds which required a charge of sixty pounds of powder. The first of these guns was mounted in a battery purposefully constructed for the weapon at White Point Garden at the immediate mouth of the Cooper River to command the inner harbor. The first shot from the cannon produced a crack in the gun that rendered it useless (Beauregard 1878:524; Pressley 1888:172).

Inner Harbor Defenses

In early 1862, newspapers declared, “The harbor is our point of greatest weakness and of greatest danger, and it is there that Charleston will be lost or saved” (*The Charleston Mercury* 17 April 1862). The Confederates worked steadily to improve the inner harbor defenses against a Federal naval incursion. The 1865 nautical chart revealed the final culmination of these fortifications and obstructions (Figure 3). On the James Island side of the inner harbor, several earthworks were sited to defend the Ashley River and the inner harbor. The largest of these was the old Revolutionary-era fortification, Fort Johnson. Confederates had first emplaced mortars there in 1861 for the bombardment of Fort Sumter.

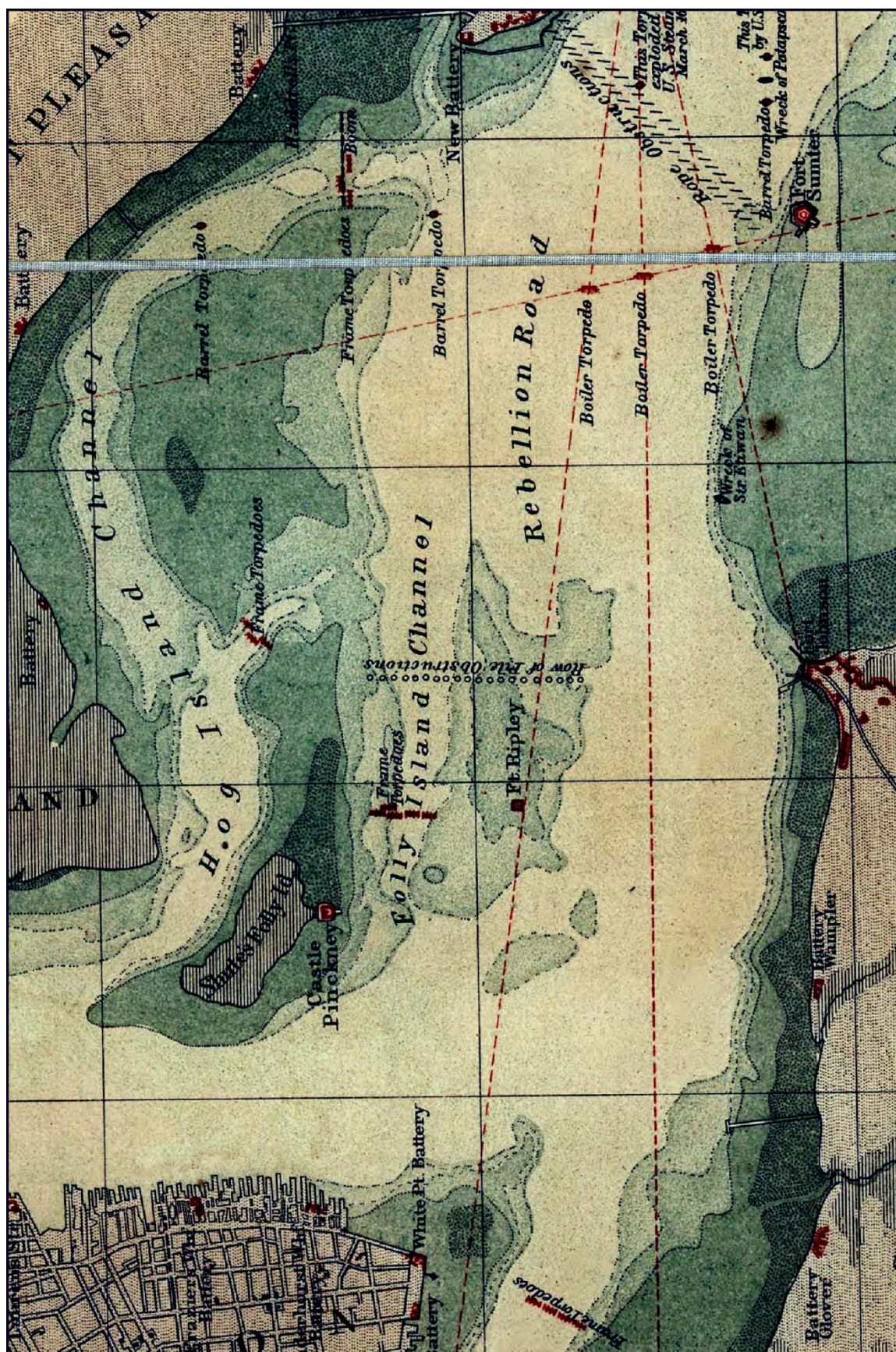


Figure 3: Detail of Inner Harbor defenses from 1865 chart (US Coast Survey 1865; SCIAA graphic).

In 1863 work accelerated to strengthen the earth works. By 1865, Fort Johnson had become a fortified camp armed with 20 heavy guns bearing on the harbor. A series of small detached earthworks extended in a southerly direction from the main works towards Morris Island. Across the inner harbor at Mt. Pleasant were three batteries, with Haddrell's Point battery the most important defending a causeway leading to the back side of Sullivan's Island and the harbor. In addition to those batteries on land, two defensive works situated in the harbor defended the water approaches to the city. Castle Pinckney, since the reduction of Fort Sumter had its casemates disarmed, the front wall covered with sloped sand and sodded, and four guns placed at the parapets (Johnson 1890:21). A shallow shoal to the southeast of Castle Pinckney, called the Middle Ground, provided a base for constructing Battery or Fort Ripley in early 1862, designed to support Fort Moultrie (*ORA*, ser. 1, vol. 6:387-388). Rubble from the Charleston fire of 1861 provided the material to build a mound on the shoal to furnish a foundation for a timber caisson on which was placed a sloped casemate. The battery was armed with four guns but by 1865 contained only a Quaker gun. This is the structure to which the guns on the *Planter* were destined but stolen away to Federal forces. Apparently in May 1862 the floating battery was still around the harbor, and in June 1863 Confederate Major John Johnson at Fort Sumter mentioned the availability of palmetto logs from the battery, then lying ashore near Fort Johnson. Intelligence obtained from a Confederate deserter in early January 1864 reported the Floating Battery was a total wreck near Fort Johnson (*The New York Herald* 30 May 1862; SCHC-Johnson; *ORN*, ser. 1, vol. 15:230).

Outer Harbor Defenses

The Main Ship Channel was the most probable Federal naval avenue of approach into Charleston Harbor (Figure 4). The channel ran north-northwesterly, or roughly parallel to Morris Island before turning westward to the throat or gorge of the harbor. Here the Confederates placed two significant fortifications to command the channel after the bombardment of Fort Sumter in 1861. Battery Gregg, located at the northern tip of the island at Cummings Point, was strongly built with thick parapets, magazines, and a bombproof. Three heavy guns dominated the channel approximately 1,400 yards distant to the east and south along the island. Situated south of Cummings Point about 900 yards was Battery Wagner. This fortification was ordered built by Pemberton in the summer of 1862 and was completed under direction of Beauregard who modified the design by adding a section with three heavy guns to bear on the channel, approximately 1,700 yards to the east. The sea face of the battery extended 300 feet along the beach and about 800 feet across the island and was completed in early 1863 (*ORA*, ser. 1, vol. 28 (part 1):96; Johnson 1890: 22). Beauregard began fortifying the southern end of Morris Island in early March 1863 but these works were incomplete when the ironclad assault on the harbor took place on 7 April 1863 (Johnson 1890:22). Another battery under construction, behind the island in the marsh at the mouth of a small creek, was the Vincent's Creek battery. Construction plans intended to dig up the marsh and float in a hulk to form the bed of the battery (*ORA*, ser. 1, vol. 14:959). This battery was situated to provide an enfilading fire against attackers approaching Battery Wagner from the south. Work at the battery was interrupted by the successful Federal assault and occupation of the south end of Morris Island on 10 July 1863. Brigadier General Roswell Ripley, CSA, believed another error in the defense of Charleston, in addition to the



Figure 4: Detail of Outer Harbor defenses from 1865 chart (US Coast Survey 1865; SCIAA graphic).

Cole's Island withdrawal, was in not preventing the passage of Federal forces crossing over from Lighthouse Inlet to Morris Island. He believed that, if checked, much of the hardships of war Charleston endured would have been prevented (Johnson 1890:482).

The next most important channel into Charleston Harbor was Maffitt's or Beach Channel oriented nearly east at its entrance to the sea and west to the harbor. Fort Moultrie and a series of batteries on Sullivan's Island controlled this channel and the throat of the channel (Figure 5). This sector of the harbor defenses had the densest concentration of fortifications, running nearly uninterrupted from the west tip of the island at Battery Bee to Fort Beauregard at the channel entrance. Four detached batteries were strung along the island and terminated at Battery Marshall located at Breach Inlet (Johnson 1890, 20-21). When evacuated by Confederate forces in early 1865, Federal troops found 61 pieces of heavy ordnance, along with several mortars, and a number of field pieces at these batteries and at Fort Moultrie.

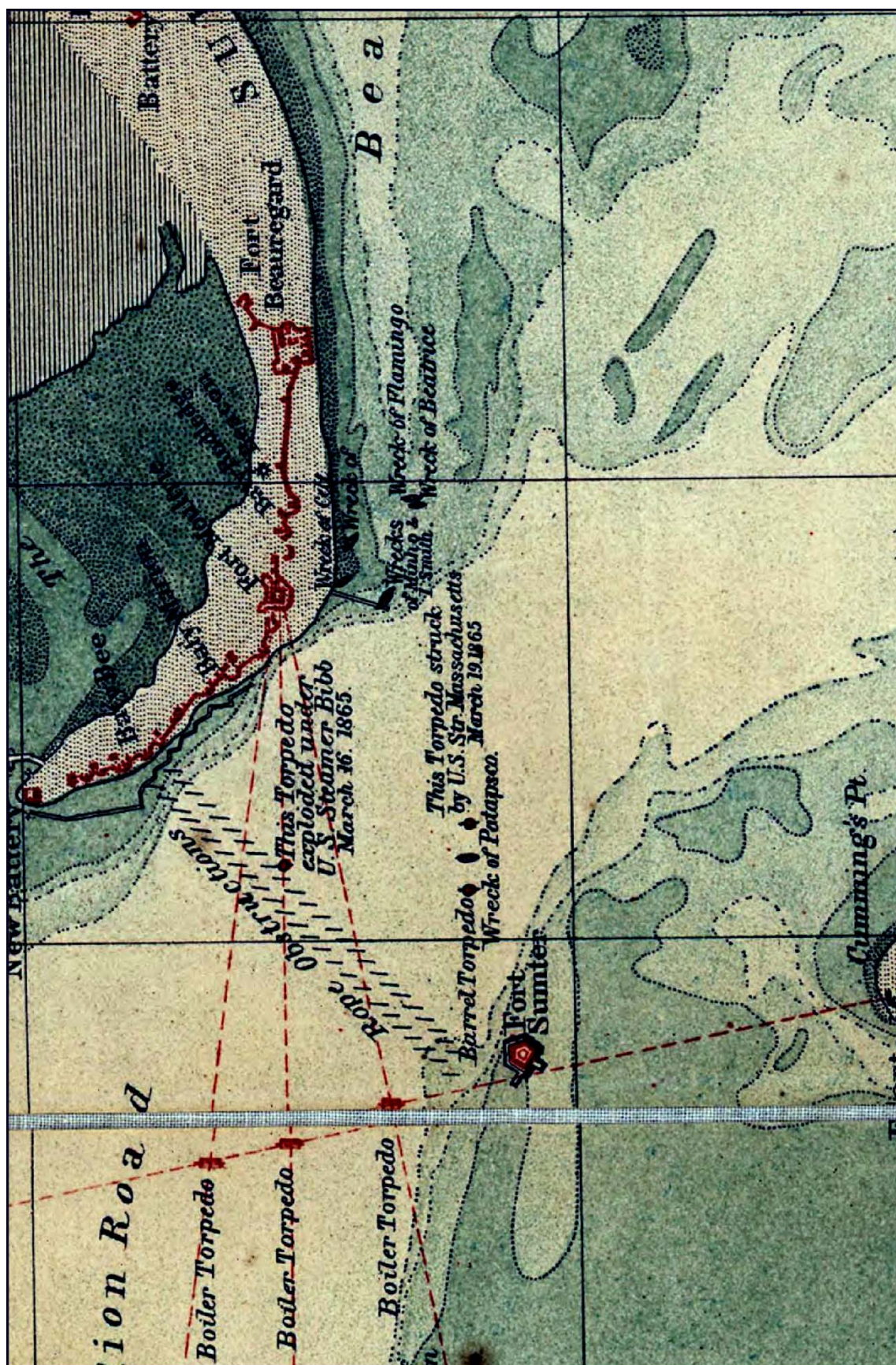
Fort Sumter, across from Fort Moultrie on Sullivan's Island, was the key to the harbor. The heavy guns remaining from Anderson's departure in 1861, augmented by ones brought in, created a formidable obstacle to passing through the throat of the harbor. Guns on the heights of the parapets created a plunging fire on passing vessels attempting to enter the harbor. By April 1863 the fort was armed with 40 guns (Johnson 1890:59). By 1865, the fort was a heap of brick and broken cannons. Despite its destruction, Fort Sumter, Fort Moultrie, and the batteries girdling the throat of the harbor on Sullivan's Island maintained the defensive line between the outer harbor and the inner harbor, a line never bent nor broke until the city and harbor were abandoned by the Confederates in February 1865.

Harbor Obstructions

As a port city, Charleston had to defend against potential land and water attacks. Experience gathered from the successful Federal fleet by-passing the field fortifications at New Orleans in the spring of 1862 demonstrated the vulnerability of a city on a waterway to naval attack. Even a city where, General Lee reputedly said, "...that the field-works thrown up for its defence [sic] were strong to an extent almost ridiculous" (*Charleston Mercury* 29 and 30 April 1862). The editors of the *Charleston Mercury* ran a series of editorials advocating the need of harbor obstructions to protect against a naval incursion.

But of what avail are field fortifications while the city is exposed to the ingress of iron-clad gunboats by the water approach. So long as the entrance to our roadstead is unobstructed, the labors on land, however well directed, are labors thrown away, or expended for the benefit of the enemy. Charleston can be saved but in one way, and that is by keeping the Yankee fleet out of our water approach (*Charleston Mercury* 29 and 30 April 1862).

In anticipation of a Union naval incursion into the inner harbor a variety of passive and explosive obstructions were placed from the throat of the harbor to the entrances of the two rivers leading to Charleston. These contrivances included pilings, booms, ropes, and torpedoes of various designs situated at important navigational channels any Federal warship



headed to Charleston had to steer through, particularly at the throat of the harbor. These obstructions were also combined with several batteries and forts to aid in crippling or destroying any invading vessel. Haddrell's Point battery covered several sets of frame torpedoes and a boom located at the entrance to Hog Island Channel. Fort Ripley, Castle Pinckney, and Fort Johnson covered the row obstructions and frame torpedoes in the Folly Island Channel. King Street and White Point batteries at White Point Gardens, and Battery Glover on James Island covered a set of frame torpedoes at the entrance to the Ashley River. Much as the harbor batteries evolved, so too did the nature and extent of the obstructions.

Pilings

The construction of harbor obstructions began in 1862 by driving pine timber piles in a double row across the Middle Ground and Castle Pinckney channel. The piles extended in a line for over a half a mile, leaving a space of three-quarters of a mile of deep water off Fort Johnson. Decay of the piles, and storms breaking the weaker piles and leaving gaps in the obstruction called for constant maintenance throughout the war (Johnson 1890:29). These piling obstructions were clearly visible to the Union navy offshore (*Report of Secretary of the Navy of 1865*:257, 284-287). An undated sketch of a view from Union-occupied Battery Wagner to the city shows a line of "thick spikes" extending out of the water, and presumably depicts the row obstructions. A Union sailor tasked to document the harbor obstructions noted the presence of the piles on 19 February 1865 (*Report of Secretary of the Navy of 1865*:278-279).

Booms

The Confederates devoted great attention to closing the throat of the harbor by a variety of physical obstructions between Fort Sumter and Fort Moultrie or Battery Bee on Sullivan's Island. Originally, a single-log boom was floated across the harbor entrance but was washed away (*Report of Secretary of the Navy of 1865*:283-284). Then under command of Pemberton in May 1862, a boom of heavy timber logs, weighted and coupled with iron, was anchored in the channel between Forts Moultrie and Sumter. The work required constant maintenance due to lost buoyancy, gales, and strong currents breaking the boom apart. By the end of 1862, the boom had broken twice, with some sections removed to obstruct minor channels in the harbor (Johnson 1890:29; *Report of Secretary of the Navy of 1865*:283-284). These booms were not fully in place when Rear Admiral Samuel F. Du Pont attacked on 7 April 1863 (*Report of Secretary of the Navy of 1865*:284-287). A letter written by a private citizen in Charleston drew a plan of the harbor on the day of the attack and shows this boom stretching from Sullivan's Island towards Fort Sumter (SCHC-Burckmeyer). Beauregard found the booms unreliable and troublesome and doubted their efficacy as a barrier to hostile vessels. A strong storm broke the timber boom in several places, leaving the channel unprotected, except for Forts Sumter and Moultrie, and consequently were not replaced (Beauregard 1878:514-516).

A section of the booms was placed at the Hog Island Channel. During their occupation of the harbor the Union navy found these booms consisted of blocks of timber,

fashioned from four squared logs, fifteen feet long and one foot square, banded by iron at each end, and secured to one another by short intervals of stout iron chain. Suspended from underneath the timber blocks were railroad iron linked together. The boom stretched across the channel a distance of 500 feet. Battery Bee and the Mount Pleasant battery provided a cross-fire over the obstruction. By the time the Federal navy entered the harbor these were worm eaten and sunk but still a navigation hazard at low tide. They later learned these booms were afloat at least until August 1864 (*Report of Secretary of the Navy of 1865*:257-258).

Ropes

The purpose of the rope obstructions was to foul the screw propeller or paddle wheels of any steamer which might attempt to pass over the obstruction, as well increasing the helpless victim's time under fire from the nearby batteries. About two months after the surrender of Fort Sumter in 1861, the Confederates stretched a single length of rope from the narrowest point at the throat of the harbor, just under a mile between the shoals of Fort Sumter and Battery Bee. The line was anchored by heavy weights at intervals of ten fathoms. They attempted this twice, but found the tide destroyed the obstruction. Modifying the plans, the ropes were then cut into lengths of 170 feet each and anchored in two rows across the channel from the breakwater near Battery Bee to Sumter. These rope obstructions were placed forward of the wooden booms to act in concert to arrest the progress of a vessel. The ropes were fashioned from two to three cables to form a mesh, the upper line had a number of floats, or casks attached, and a rope submerged in the water with a number of 15-foot, or 50-foot lines attached to act as streamers in the current. The rope mesh was anchored to the bottom by five-armed grapnel hooks or obstruction anchors (*Report of Secretary of the Navy of 1865*: 276-278; 283-284; Johnson 1890:30; Beauregard 1878:514-516). The newspapers reported about these obstructions: "We do not envy the occupants of any hostile vessel that, entangled in these obstructions, may be subjected to the cross fire of the big Columbiads, Dahlgrens and rifled guns of the batteries of Forts Moultrie and Sumter" (*Charleston Mercury* 31 October 1861). After the 7 April 1863 Federal ironclad attack, a rope obstruction fashioned with casks as floats was put down as a single line. Heavy anchors secured each end, with intermediate anchors spaced every 50 feet apart. These obstructions were then followed up by a series of rope sections after the Federal landing on Morris Island in July 1863, created from a single cable, floated in two lines and anchored in sections at one end only, bore all the streaming ropes (*Report of Secretary of the Navy of 1865*:284-287; Johnson 1890:30).

The next and last evolution of rope obstructions was considered the most dangerous and effective to impede a ship's progress. These consisted of buoys made of palmetto wood, about 3-4 feet in length, and attached to the logs were 7-inch hemp hawsers, spaced about 20 feet apart, and at intervals anchored by a grapnel hook. They commenced at Fort Sumter about 300 yards away and ran in a direct line to Battery Bee. Intended as two coherent lines of rope obstructions, storms and currents, however, caused them to drift about the harbor entrance. They were in a series of separate subdivisions and spaced about 30-50 feet apart, numbering about 60 sets. These particular rope obstructions were placed in late January 1865. After the evacuation of Charleston by Confederate forces in February 1865, the Union

navy removed 226 sections of these kinds of rope obstructions (*Report of Secretary of the Navy of 1865*:276-278, 284-287).

The efficacy of the ropes to arrest the progress of a steamer was demonstrated shortly after these cables were in position. A blockade runner accidentally crossed the end of the rope obstructions near Fort Moultrie and one of the streamers got entangled around the shaft, checking the propeller's revolutions. The vessel was compelled to drop anchor to avoid drifting on nearby torpedoes or going ashore. Afterwards the vessel required work at the dry dock for the removal of the streamer to regain use of its propeller (Beauregard 1878:514-516). Several Confederate harbor vessels were also ensnared by the rope obstructions. *Etiwan* drifted onto the obstructions which stopped a paddle wheel, and *Chesterfield*, steaming against the ebb tide, drew up some rope obstructions in its wheels. The ironclad ram CSS *Palmetto State* also fell afoul of the ropes snarling the propeller and had to anchor to remove it (*Report of Secretary of the Navy of 1865*:283-284).

The rope obstructions extended from Sullivan's Island to the shoals on the west side of Fort Sumter. According to Major John Johnson, CSA, an opening of approximately 300 yards allowed the passage of blockade runners and other harbor vessels safely through the rope obstructions (Johnson 1890:30). Beauregard also mentioned that a gap existed between the rope obstructions and Sullivan's Island to permit safe passage (Beauregard 1878:514-516). Interviews with knowledgeable sources after the Confederate evacuation of Charleston revealed that prior to placing a number of large torpedoes at the Fort Sumter gap that a vessel could safely pass through the outer and inner harbors. The pilot of *Palmetto State* reported bringing the ironclad south through the Main Ship Channel and found no obstructions barring their progress in or out of the harbor during the night after the attack of the Federal ironclads on 7 April 1863. Another pilot said he had no hesitations in bringing any ship that could cross the bar through the Main Ship Channel into the harbor. A blockade runner captain related that he had frequently run through Maffitt's Channel and headed towards the channel near Fort Sumter to clear the rope obstructions. Each pilot expressed no fear in navigating a ship through the Main Ship Channel, although they did respect the shore batteries. The channel next to Fort Sumter was not blocked until several torpedoes were placed there in late 1864 and 1865, the ones that claimed USS *Patapsco* in mid-January 1865 (Johnson 1890:482-484).

Torpedoes

Three kinds of torpedoes were deployed in Charleston Harbor: inclined or frame torpedoes, floating torpedoes, and boiler torpedoes. Most were detonated through contact with a fuse, although galvanic or electric triggers were attempted. Brigadier General Beauregard reportedly was quoted as having "...more reliance in one torpedo than five 10-inch Columbiads" (*Report of Secretary of the Navy of 1865*:286). The first torpedoes of any kind placed in Charleston waters occurred in early February and March 1863 under orders from Brigadier General Beauregard. These were in the Ashley River, in Hog Island Channel, and in Castle Pinckney or Folly Island Channel (Johnson 1890: 32; *Report of Secretary of the Navy of 1865*:284-287). These were the fixed torpedoes, also known as frame, raft, or incline torpedoes, and were fashioned from three to four heavy timbers parallel to each other and

several feet apart. Cross-timbers connected the parallel timbers together to create a frame. At the top end of each timber was attached a fused, cast-iron torpedo. Chains and rock weights held the frame torpedoes at an incline and slightly below the water to cause the torpedoes to strike the bottom of a vessel. The lethality of this defensive structure was demonstrated when the Confederate steamer *Marion*, while deploying a set, accidentally struck one and had its machinery and bottom destroyed, causing the vessel to sink (*Report of Secretary of the Navy of 1865*:259-260; 275-276).

A second type used in the harbor was floating torpedoes. These kinds of torpedoes were not set in the harbor until after the Federal attack on Morris Island in July 1863. That night Confederates placed at least twenty at the entrance to the Cooper River and another fifteen in front of the rope obstructions between Forts Sumter and Moultrie. These floating torpedoes were crafted from 13-gallon lager beer barrels with a cone attached at two ends to withstand the current. Each torpedo contained approximately seventy pounds of powder, with two fuses, and when anchored kept the fuses upright to contact the bottom of a boat. They floated just below the surface of the water. There were also ones electrically detonated by a cable and placed between Battery Bee and the Middle Ground (*Report of Secretary of the Navy of 1865*:284-287; Beauregard 1878:514-516). Floating torpedoes were deployed throughout the remainder of the war, and generally forty to fifty torpedoes were kept on hand for rapid deployment throughout the harbor. In Charleston Harbor, and adjacent streams, the Confederates had deployed approximately one hundred and twenty-five torpedoes (Beauregard 1878:521). These types of torpedoes were troublesome as they shifted with the tide, and in June 1864, the harbor steamer *Etiwan* accidentally struck one of these torpedoes and then beached itself on the shoals between Fort Johnson and Fort Sumter (*Report of Secretary of the Navy of 1865*, 258-259; 289-291). In the middle of January 1865, Lieutenant General William Hardee, CSA, ordered the placement of a number of floating torpedoes about the harbor in anticipation of a naval attack. Sixteen were placed in the vicinity of the rope obstructions between Forts Sumter and Moultrie, and seven at the entrance to Hog Island Channel. One of these torpedoes off Fort Sumter subsequently sank the Union ironclad *Patapsco* after striking it during torpedo clearing operations (*Report of Secretary of the Navy of 1865*, 258-259; 290-291).

The third kind of Confederate torpedo were boiler torpedoes. These were boilers fastened to a wooden frame, containing approximately 1,000 to 3,000 pounds of powder, and exploded by a galvanic battery connected by insulated wire (*Report of Secretary of the Navy of 1865*:260). A few days before the Federal ironclad attack on 7 April 1863, Brigadier General Ripley ordered a boiler 18 feet long and 3 feet in diameter, containing 3000 pounds of gunpowder, to be placed in the Main Ship Channel opposite of Fort Wagner. The steamboat *Chesterfield* successfully positioned the torpedo where ordered, but while paying out cable, it lost steam which resulted in the crew reeling out two miles of cable instead of one. Then on the day of the attack, when *New Ironsides* reportedly lay over or near the torpedo, it failed to detonate. Retrieving the line revealed the excess cable could not produce a spark, which prevented the boiler torpedo from exploding. Ripley also had deployed another boiler torpedo off White Point Gardens on 5 April 1863 (*ORA*, ser. 1, vol. 14:948-952). After the Confederate evacuation of the city, the Union navy found three boiler

torpedoes in the main channel between Battery Bee and Fort Johnson, and one on a wharf ready for use (*Report of Secretary of the Navy of 1865*:260).

During the 7 April 1863 ironclad attack, the captain of *Weehawken* spotted rows of casks very near each other, but mistook them for a line of torpedoes. These buoys were not torpedoes but related to the rope obstructions. As noted previously, the first deployment of floating torpedoes occurred after the Federal attack on Morris Island, and Major Johnson stated after the war there was no evidence of any torpedoes placed between Fort Sumter and Sullivan's Island before 10 July 1863. The Confederates pointed this out to refute Union claims of the presence of torpedoes at the harbor entrance and a primary cause for not penetrating through to the city during the Federal ironclad attack (Johnson 1890:32). As the Union navy pressed closer to the harbor entrance after the fall of Morris Island in early September 1863, these buoys were easily observed. Daily reports from the lead picket monitor off Cummings Point usually contained the number of buoys observed that day, such as on 27 September 1864, when the monitor USS *Nahant* reported 80 buoys visible in groups of five to six. Union picket and scout boats reached the obstructions to investigate and would cut them away, but the night and presence of Confederate vessels made the work perilous (*Report of Secretary of the Navy of 1865*, 253-257).

Naval Assets

At the start of the Fort Sumter crises in early 1861, South Carolina purchased or commandeered several wooden steamboats and schooners, and armed them for use as patrol boats and for naval purposes in the harbor. Several vessels were also outfitted as privateers that operated along the Atlantic Coast in search of prizes. As the threat of a new type of vessel, the ironclads, emerged the Confederates began construction on two ironclads for use in the harbor, eventually totaling four built by the end of the war. Besides these four vessels, a small fleet of torpedo boats, composed of a variety of assorted small watercraft outfitted with a newly devised spar torpedo roamed the waters of the harbor. Another new class of vessel, semi-submersibles, were constructed and known by the name as *Davids* . Perhaps the most innovative was the submarine. *H. L. Hunley*, a submarine originally constructed in Mobile, Alabama, was transported via railroad to Charleston with the intent to attack the Federal fleet off Charleston Harbor. Most of the naval innovations were championed and pushed for by the Army general Beauregard, although Commander Duncan Ingraham had command of CS naval forces in Charleston Harbor. The following section describes these naval tools of war.

Ironclads

Immediately after the USS *Monitor* and CSS *Virginia* (ex-USS *Merrimac*) battle in Hampton Roads, Virginia, and learning of Federal plans to build additional monitors, the newspaper editors of the *Charleston Mercury* declared the Confederacy must "...meet iron with iron" (*Charleston Mercury* 15 March 1862). Adopting the sloping casemate-style for the preferred designs for their ironclads, Confederate contractors began building two ironclads for use in Charleston Harbor waters, CSS *Chicora* and CSS *Palmetto State*. CSS

Chicora was 150 feet in length, 35 feet in beam, and had a draft of 12 feet. The ironclad was designed with a ram in the front and was launched in late August 1862. The casemate was constructed of oak and pine 22 inches thick covered by 2 inch thick iron plates. These plates extended five feet below the waterline. The engine was taken from a tug boat which powered a single propeller eight feet in diameter. The battery reportedly consisted of two 9-inch smoothbore guns mounted in pivots, and four 32-pounders in broadsides, two to a side. Also under construction at the same time was CSS *Palmetto State* which was launched in October 1862 and had the same dimensions as *Chicora*. Differing slightly in design, *Palmetto State*'s casemate slanted in towards the waterline, forming a knuckle, and had an armored pilothouse just aft of the smokestack. The armament consisted of two 7-inch Brooke rifles mounted in pivot fore and aft, and two 9-inch smoothbore shell guns in broadside, one on either side. By June both vessels were ready for plating but transportation issues delayed delivery of the heavy plates and the warships were not armored until end of August (Tomb 2005:54-56). Both vessels were painted a pale blue or bluish-grey—to camouflage them in a similar manner as the blockade runners. Both *Palmetto State* and *Chicora* had a crew of approximately 120-150 men. In February 1863, *Palmetto State* was equipped with spar torpedo on a 20-foot staff that could be raised or lowered six feet into the water (Parker 1883: 288, 292-293, 306-307). In early 1864 another ram was added to the fleet, CSS *Charleston*, with dimensions of 180 feet in length, 34 feet in beam, a depth of 14 feet, and armed with four rifled guns and two 9-inch smoothbores. Although laid down in 1862, and commissioned nine months later, the ironclad was not available for service until 1864, whereupon it became the flagship of the Charleston squadron (*DANFS*). A fourth Confederate ironclad, CSS *Columbia*, was completed in early 1865. *Columbia* was built of yellow pine and white oak, and measured 216 feet in length, 51.4 feet in breadth, and had a hull depth of 13.6 feet. The casemate, which was shortened to conserve iron, was plated with 6-inch iron, and armed with six guns. Disabled during an accident, this vessel never saw service before the Confederates evacuated the city (*Report of Secretary of the Navy of 1865*, 260-261; Johnson 1890:34). The Confederate ironclads were "...held as part of the inner circle of defence [sic]" (Parker 1883:309).

Spar Torpedo Boats

The Spar Torpedo boats were a collection of miscellaneous boats and barges that were outfitted with a spar torpedo. Captain Francis D. Lee, CSA, was the inventor of the "spar-torpedo" in Charleston Harbor. The arrangement consisted of a water-tight explosive device attached to a spar of wood or iron, approximately 10-12 feet or longer in length, suspended about five to six feet underwater, to detonate on contacting the side of a ship. In March 1863, Lee tested the device for Beauregard by successfully sinking a hulk of an unfinished and condemned gunboat anchored in the harbor. The intended purposes of this class of vessels were to patrol the harbor and to attack Federal warships as opportunities arose, particularly those operating in the sounds and harbor (Johnson 1890:30-31; Beauregard 1878:520-521; *ORA*, ser. 1, vol. 14:820-821). In one attempt to strike at the monitors after the 7 April 1863 ironclad attack, a flotilla of six navy cutters and an assortment of boats, skiffs, and canoes were outfitted with 20-foot-long poles attached to the bow with a 60 pound torpedo at the end. A subsequent modification removed the spars to attach them six feet below and along the keel rather than the bow (Parker 1883:312-317;

ORA, ser. 1, vol. 14:898). Despite the departure of the monitors before undertaking the “forlorn hope,” this fleet of small boats was maintained throughout the summer of 1863 and considered an integral part of the harbor defenses (Parker 1883:315; Johnson 1890:74). In early March 1863, Beauregard outfitted ten boats with the spar torpedo arrangement for the Navy Department. On the night of 18 March, Lieutenant William Glassell, CSA, ventured forth in a small boat with a crew of seven equipped with a spar torpedo to attack a blockader but grounded on Drunken Dick Shoal, and aborted the mission (*ORA*, ser. 1, vol. 14:837). Beauregard also suggested that Commodore Ingraham have at least a dozen vessels fitted with Lee's spar torpedo to not only defend the harbor against ironclads but to blow up blockaders at night (*ORA*, ser. 1, vol. 14:821). In several instances, Beauregard referred to these as “spar-torpedo row boats,” and suggested having steamers tow the vessels out to attack USS *New Ironsides*. While these vessels did not successfully attack a Union warship, they did cause the blockaders to be vigilant by deploying various nets and booms to prevent an attack by a spar torpedo-equipped vessel (*ORA*, ser. 1, vol. 14:887-888; 895; 898; Beauregard 1878:520-521).

Semi-submersibles, “Davids”

In 1863, a group of local Charlestonians built a small cigar-shaped boat they called the *David*, named after the builder, David Ebaugh (Ragan 2005:142). The vessel was planned and constructed to attack *New Ironsides*. The vessel was about fifty feet long, with a diameter of five feet at its middle, and was propelled by a small screw propeller worked by a small steam engine. The vessel was a semi-submersible that provided a low relief on the water, the hatch coamings standing about 2 feet out of the water for a length of 10 feet, and a smokestack. The vessel was heavily ballasted to float deeply in the water. The portion remaining above the water was painted a bluish color (*ORN*, ser. 1, vol. 14:12; Glassell 1877:230). Beauregard ordered it fitted with a Lee spar-torpedo charged with seventy-five pounds of powder (Beauregard 1878:517-519). The vessel, under command of Glassell successfully detonated a charge against the side of *New Ironsides* hull in early October 1863, causing damage to the hull but not enough to force the warship from its blockade station. *David* also attempted to attack several other vessels on the blockade station off Charleston but caused no damage. The success of the attack on *New Ironsides* caused the Confederates to build more of them in Charleston. A newspaper article originally printed in Philadelphia and copied by the *Charleston Mercury* reported that Union picket boats had seen several *Davids* during the night cruising the inner harbor, either doing picket duty or waiting for an opportunity to strike at the blockaders (*Charleston Mercury* 23 April 1864). When the Union navy entered the harbor in February 1865, Dahlgren reported finding three *Davids*, or as the Federal navy called them torpedo boats, sunken in the harbor, and another six in various states of repair and completion. They salvaged one measuring 64 feet in length with a 5.5 foot diameter and capable of going five knots (*Report of Secretary of the Navy of 1865*:260).

In early 1863, another semi-submersible was under construction, a steam torpedo ram. The vessel was designed by Lee, intended to carry a spar torpedo, armored, and fast. Despite having the hull built, boiler placed, and engine and cast iron for the prow, the ram was never completed, as the iron to armor it was not forthcoming. Beauregard appealed to higher authorities to provide the funds to complete the vessel, but apparently those monies

were instead devoted to building ironclads (*ORA*, ser. 1, vol. 14:906, 917-918, 1017-1019; Johnson 1890, 30-31).

H.L. Hunley Submarine

In July 1863 in Mobile, Alabama, a group of machinists and others, headed by George McClintock and H. L. Hunley launched a submarine that after his death was called the *H. L. Hunley*. The submarine was created as a privateer to receive a bounty on any Federal vessel they sank or destroyed. The vessel was fashioned either from a steamboat or railroad engine boiler and could accommodate nine crew members (Ragan 1995:30). Measuring approximately forty feet in length and about four feet in diameter, the vessel was hand-cranked by eight men while controlled by a captain. The vessel had two hatches furnished to provide entry into the submarine and small port glasses for outside observations, a snorkel box to draw fresh air inside the hull, and a series of deadlights to allow ambient light in. The captain controlled the diving planes at the forward area of the submarine and the rudder while the crew provided the motive power to the propeller. Attached to the underside of the hull were detachable lead weights to provide weight and stability. Fore and aft bulkheads separated the crew from the pumping in of water to increase the weight of the submarine to allow diving operations. As conceived by the designers, the submarine was intended to dive beneath a ship while towing an explosive behind that would detonate on contact with the hull. While tests were successful in Mobile Bay, the shallowness of the waters in Charleston Harbor where the blockaders were stationed limited the submarine's effectiveness to dive under their bottoms. In late July 1863, consultation with the CSA Navy Department suggested that Charleston Harbor was a more appropriate theater of operation for the submarine. Beauregard assented and on 12 August 1863 the submarine arrived by railroad to Charleston. Later the spar torpedo favored by Beauregard was installed as the weapon delivery system for striking at the wooden blockaders off the harbor (Ragan 2005:157-160). For readers desiring more information about the submarine a number of books have been written, especially *The Hunley* by Mark Ragan, and websites that recount the history, recovery, and archeology of this unique vessel.

Blockade Runners

Technically non-combatants, these vessels provided valuable military supplies, and other civilian goods, to support the Confederacy. Military goods included large ordnance, rifles, clothing, saltpeter, lead, and other necessities to arm and outfit an army. At the initial stages of the war, the blockade running fleet was composed of merchant steam and sailing vessels, which had a negligible impact on the needs of the military. The successful venture of the blockade runner *Bermuda*, an iron-hulled, screw propeller, with large cargo capacity, departing from England delivered a quantity of military goods to Savannah, Georgia on 18 September 1861. The vessel returned laden with cotton to secure an immense windfall. The success of the voyage inspired other English business concerns in concert with their Southern counterparts to organize blockade running ventures (Wise 1988:50-52). Often times the Northern newspapers and military reports referred to the blockade runners as "anglo-rebel blockade runners." These vessels used several close-by foreign ports to transship goods

destined for the South and Charleston. These ports on the Atlantic Ocean consisted of Nassau in the Commonwealth of The Bahamas, Bermuda, and Halifax in Nova Scotia, Canada. In the early stages of the war, practically any sized steamer was ensured a high percentage of evading the blockade in or out of Charleston Harbor. Even sailing vessels had a good chance of success. By 1862 forty sailing vessels had departed Charleston laden with cotton. As the effectiveness of the Union blockade increased in 1862, a need for a more specialized vessel with light draft was required. Most companies preferred shallow-drafted paddle wheelers. A particular vessel-type suited for this type of venture was associated with the Clyde River, Scotland, known as “Clyde Steamers.” They had long hulls, narrow beams, paddlewheels, powerful engines, light drafts, and shallow drafts (Wise 1988:107 110).

Union Naval Preparations

A week after the firing on Fort Sumter, Lincoln proclaimed a blockade of southern ports to prevent the entrance and exit of vessels on 19 April 1861. On 10 May 1861, the first Union blockading vessel, USS *Niagara*, arrived off Charleston Harbor, becoming the first visible Federal presence since the surrender of Fort Sumter (*New York Herald*, 9 May 1861; *Charleston Mercury* 14 May 1861; Browning 2002:10, LOC-Casey). The Atlantic southern coast at the start of the blockade was maintained by the Atlantic Blockading Squadron and then divided into two squadrons: the North and South Atlantic Blockading Squadron in October 1861 (*ORN*, ser. 1, vol. 6:313). At first content to enforce the blockade, the navy expanded its role to include more offensive actions starting with the capture of two forts at Hatteras Inlet, North Carolina on 28-29 August 1861, followed by the successful capture of Port Royal Sound on 7 November 1861. From here the South Atlantic Blockading Squadron, having responsibility of the Atlantic coastline from the border between North and South Carolina to Cape Canaveral, Florida, maintained a safe anchorage with its headquarters, a flotilla of supply vessels, and a floating machine shop from which to operate. The role of the blockading fleet off Charleston also evolved from merely enforcing the blockade to engaging in naval and combined offensive actions to wrest Charleston Harbor from the Confederates. The squadron was in existence from 12 October 1861 to 25 July 1865, and was commanded by Rear Admiral Samuel F. Du Pont from October 1861 to July 1863 and Rear Admiral John Dahlgren from July 1863 to July 1865. The following section describes the several classes of Federal warships used to enforce the blockade and to launch offensive actions against Confederate positions.

Union Warships

On 19 April 1861 Lincoln had called for a competent force posted to prevent the entrance and exit at southern ports which at the time of the proclamation consisted of 69 naval warships in various locations around the world, in ordinary, or in repair. By war's end this fleet was augmented by a mixture of purpose-built steam and sailing warships including ironclads of various kinds, and a variety of civilian ships numbering about 600 (Browning 2002:7). The first blockaders consisted of deep-drafted sailing vessels ill-suited for service on the shallow Southern coastline and lacked the necessary speed to chase steamers. Efficiency of the blockade was increased with the building and purchasing of fast and

shallow-drafted steamers. Wooden steamboats principally maintained the blockade at the various inlets and harbors in the South Atlantic Blockading Squadron theater of operations. By early 1863 a new type of warship entered the fleet off Charleston composed of several ironclad variants. These were the *Passaic*-class and later augmented by the *Canonicus*-class both with revolving turrets, and two other types classed as experimental: USS *Keokuk*, and USS *New Ironsides*. These were the primary offensive naval weapons intended to attack Charleston Harbor, to enforce the blockade, and to assist the Army by bombarding land fortifications. Additionally, a host of supply and other auxiliary vessels supported fleet operations.

Wooden Warships

The blockading fleet off Charleston Harbor consisted of an assortment of purpose-built naval vessels and purchased vessels, predominately steamers, both side-wheelers and screw-propellers, and augmented by some sail vessels, of which the following ships provide an illustration of the vessels used to affect the blockade off Charleston Harbor. The first ship to blockade the port of Charleston was USS *Niagara*, a 5,540-ton screw steam frigate measuring 328.10 feet in length, 55 feet beam, and a draft of 24.5 feet. *Niagara* was launched at the New York Navy Yard in 1855 and commissioned in April 1857. Armament consisted of twelve 11-inch Dahlgren smoothbores (*DANFS*). To remedy the deficiencies of the Federal naval fleet, the navy launched a program to rapidly build a number of gunboats. USS *Unadilla* was a “90-day gunboat” built right after the war commenced in April 1861 and was completed by 17 August and commissioned on 30 September 1861. *Unadilla*, a 507-ton screw gunboat, measured 158 feet in length, beam of 28 feet, a depth of hold of 12 feet, and a draft of 9.6 feet. The gunboat was armed with one 11-inch Dahlgren smoothbore and two 24-pounder howitzers (*DANFS*). Another naval warship, USS *Housatonic* was a screw-sloop of 1,240-tons which measured 207 feet in length, 38 feet in beam, a draft of 8.7 feet, and had a speed of nine knots. *Housatonic* was launched on 20 November 1861 at the Boston Navy yard, and following a lengthy delay was finally commissioned on 29 August 1862. The vessel was heavily armed with an assortment of cannons: one 100-pounder Parrott rifle, three 30-pounder Parrott rifles, one 11-inch Dahlgren smoothbore, two 32-pounders, two 24-pounder howitzers, one 12-pounder howitzer, and one 12-pounder rifle (*DANFS*). USS *Pocahontas* was built in 1852 for commercial use, and then purchased by the navy in 1855, and in 1860 underwent an extensive refit and enlarged to 650-tons. *Pocahontas* was a screw steamer measuring 169.6 feet in length, 26.3 feet in beam, and had a depth of hold of 18.6 feet. The vessel was armed with four 32-pounders, one 10-pounder, and one 20-pounder Parrott rifle (*DANFS*).

The following vessels were merchant vessels at the start of the war and then purchased and transformed into navy warships. USS *Flambeau* was built in 1861, purchased by the navy on 14 November 1861, and commissioned on 27 November 1861. The vessel was a 850-ton screw steamer measuring 180 feet long, 30 feet breadth, and having a draft of 11 feet with an armament of one 30-pounder rifle and one 20-pounder rifle (*DANFS*). The 1,261-ton side-wheeler USS *Alabama*, built in 1850, was 214.4 feet long, a beam of 35.2 feet, a depth of 22 feet, a draft of 14.6 feet, and a speed of 14 knots. The vessel was heavily armed with eight 32-pounder smoothbores. *Alabama* was a merchant vessel that was

commandeered at the start of the war to restore control of the Potomac River in mid-1861 (*DANFS*). Due to the constant vigilance and operation off the coast, these vessels went in for repairs at Port Royal, or if requiring major work, sent north for repairs. Many of these vessels remained on station in the South Atlantic Blockading Squadron, but would also be assigned to other theaters of operation as ordered and needed.

Ironclads

Following the success of USS *Monitor* that fought CSS *Virginia* at Hampton Roads on 9 March 1862, the Union navy contracted with John Ericsson to build an improved version of the original monitor. Known as the *Passaic*-class, these were the first monitors to operate off Charleston, arriving in early 1863. There were nine monitors of this class built, varying little from each other, measuring 200 feet length overall, an overall beam of 45 feet, a depth of hold of 12 feet and 6 inches, draft of water of 11 feet, and a tonnage of 1,800 tons. The actual size of the hull was 159 feet long and had a 37.8 foot beam. The thickness of the side armor belt was 5 inches, composed of a laminate of five 1-inch-thick iron plates backed by 3.3 feet of wood. The deck was plated with two ½ inch iron plates. The turret had an inner diameter of 21 feet. The 11-inch thick turret was composed of eleven 1-inch rolled sheets of iron, and stood 9 feet high. Although designed for two 15-inch Dahlgren smoothbores, delays in production of the guns, forced an 11-inch smoothbore as a substitute for one of the 15-inch guns. Three of the monitors had 150-pounder Parrott rifles instead of the 11-inch, including USS *Patapsco*. The 15-inch cannons also did not project outside the turret forcing Ericsson to devise a smoke box to force the smoke out of the turret. The pilot house above the turret was fashioned from eight 1-inch iron plates with a six foot inner diameter and height. The turret revolved around a fixed vertical shaft on which the pilot house was attached. Two boilers powered the two engines which drove the 12-foot diameter single screw propeller. Unlike the original *Monitor*, *Passaic*-class monitors had an armored pilot house above the turret, and a more conventional hull shape. In addition, the bow and stern deck overhangs were reduced in size (*New York Times* 10 October 1862; West 1996:12-13; *Scientific American* 12 December 1863:372-373). All nine *Passaic*-class monitors saw action off Charleston Harbor, attesting to the importance of taking Charleston.

Even as the *Passaic*-class monitors were under construction a third-generation of turreted monitors based on Ericsson's designs were begun in September 1862. Known as the *Canonicus*-class, these monitors were essentially an enlarged version of the *Passaic*-class monitors, increasing in size from 200 to 235 feet length overall while the other measurements remained the same. Two additional boilers were added to a total of four, and the propeller size was increased from 12-foot to 14-foot diameter. Construction delays due to substantial mid-build specifications, including increasing the depth of hold, moving the turret forward, and other modifications to the plans, postponed completion for over a year. Design improvements following the 7 April 1863 ironclad attack on Fort Sumter attempted to fix some of the problems suffered by the severe pounding the *Passaic*-class monitors received from the Confederate guns. Loose bolts and nuts injured a number of the sailors during the attack and killed the quartermaster of USS *Nahant*. Subsequently, *Canonicus*-class monitors used rivets, driven from the inside and smoothed on the outside, to fashion the turret and pilothouse, along with other improvements to address problems discovered during the battle.

To improve the crew's comfort, a permanent armored air funnel was placed aft of the smokestack to increase ventilation inside the hull. Armament consisted of two 15-inch Dahlgren smoothbores, which had been lengthened by eleven inches to permit the guns to protrude out of the turret. Another difference between the two classes was the fabrication of a protective iron screen around the upper diameter of the turret at the pilot house level to keep water out during a voyage and to protect against snipers. This addition was retro-fitted to the *Passaic*-class vessels in early 1864 (West 1996:14-16). Only two *Canonicus*-class monitors served off Charleston Harbor, the name sake of the class, USS *Canonicus* and USS *Mahopac*, both arriving in early February 1865 and in time to enter the harbor after abandoned by the Confederates (DANFS).

The 677-ton, double-casemated and twin-screwed ironclad USS *Keokuk* was launched at New York City by contractor Charles W. Whitney on 6 December 1862. The warship was an experimental design, and a newspaper article reporting on *Keokuk*'s initial sea trials on 24 February 1863 deemed the vessel "the strangest looking vessel afloat" and commented "No ship of her shape had been under fire, and the scientific world will await with interest her conduct in battle" (*New York Times* 25 February 1863). The ironclad was 159.5 feet long, 36 feet beam, depth of hold of 13.5 feet, and a draft of 8.5 feet. The round casemates, pierced with three gun ports each, were stationary (ORN, ser. 2, vol. 1:120). The armor consisted of horizontal iron bars alternating with strips of wood and sheathed with sheet iron with a total thickness of 5.75 inches. The vessel was armed with two 11-inch Dahlgren smoothbore cannons. Ordered to duty with the South Atlantic Blockading Squadron, *Keokuk* arrived at Port Royal on 26 March 1863, and then participated in its first and last naval battle on 7 April 1863 that resulted in its sinking the next day (DANFS, vol. 3:628; ORN, ser. 1, vol. 14:23-24, 27).

USS *New Ironsides* was a 3,486-ton ironclad screw steamer frigate that was 230 feet in length, 57.6 feet in beam, a depth of hold of 23 feet, a draft of 15.8 feet, and a speed of 7-8 knots. The vessel was built in Philadelphia, Pennsylvania, and launched on 10 May 1862 and commissioned on 21 August 1862. The ironclad was armored at the waterline, 3 feet above with 4.5 inch thick plates and 4 feet below with 3-inch thick iron plates. Above the waterline belt, the armor, composed of 4.5 inch thick iron plates, extended to protect the battery for 170 feet. The deck was composed of 3 inches of yellow pine faces with 1 inch thick iron plates (Roberts 1989:110-111, 114, 119). The battery was in broadsides of eight guns and evolved during the war. During the 7 April 1863 attack on Charleston Harbor the armament consisted of two 150-pounder Parrott rifles, fourteen 11-inch Dahlgren smoothbores, and a month later added two 50-pounder Dahlgren rifles. The warship was bark rigged with three masts, but the masts were cleared to ready for action. A round armored pilothouse, constructed of iron plates six inches in thickness, was situated aft of the smokestack from which to direct the ship during battle. The ironclad frigate joined the South Atlantic Blockading Squadron off Charleston on 17 January 1863, and maintained a near constant presence there until ordered north for repairs in May 1864 (DANFS; ORN, ser. 2, vol. 1:159; *New York Times* 7 September 1862).

Picket and Scout Launches

An important component of the Union blockade was the use of small launches or cutters manned by officers and sailors from the larger ships to operate inshore during the night. The small boats acted as pickets in an effort to prevent blockade runners from entering and exiting the harbors. They were also used as scout boats to gather intelligence of the obstructions at the throat of the harbor and to clear them if possible, as well as observing harbor activities. These boats were either classified as launches, and 1st through 4th cutters. Oftentimes in reports they are also referred to as barges, and with a blunt bow, wide beam, and square transom were barge-like in appearance. A large launch measured approximately 38 feet in length and 10 feet in beam, with a freeboard of 4 feet. The large launches were crewed by up to 20 men, each equipped with rifles and revolvers. The launches, and 1st and 2nd cutters, also deployed with either a 12-pounder or 24-pounder boat howitzer (USN 1866:Part 2—3-27).

Union Naval Strategy off Charleston Harbor

The enforcement of the blockade was the primary responsibility of the South Atlantic Blockading Squadron off Charleston, and throughout its territory along the Atlantic coastline from South Carolina to Florida. The arrival of *Niagara* on 10 May 1861 to enforce the blockade signaled the first phase of naval operations at Charleston Harbor. Stationed off the bar of the Main Ship Channel, other blockading vessels began arriving throughout the next months and subsequent years, taking up stations at the other channel entrances to the harbor, namely Lawford, Swash, North, and Maffitt's/Beach Channel. These stations were situated beyond the 18-foot contour line or outside the large ebb-delta complex that separated the harbor from the ocean. In an attempt to more effectively prevent blockade runners from evading the blockade, two stone fleets were sunk in late 1861 and early 1862. The First Stone Fleet was sunk at the bar of Main Ship Channel in December 1861, while the Second Stone Fleet was sunk at the entrance to Maffitt's/Beach Channel in January 1862. Mounting pressure to attack and capture Charleston, "the cradle of secession," led to more offensive naval actions with the arrival of the ironclad fleet in early 1863. Du Pont ordered an ironclad assault on 7 April 1863 against Charleston Harbor, specifically directed at Fort Sumter, which was decisively repulsed by Confederate cannon fire. Relieved of command by his own request, Du Pont turned over command of the squadron to Rear Admiral John Dahlgren. Dahlgren coordinated with his army counterpart, Brigadier General Quincy Gillmore, to attack Confederate positions on Morris Island, notably Battery Wagner, and Fort Sumter in the summer and fall of 1863. Dahlgren ordered a navy assault on Fort Sumter on the night of 8 September 1863 composed of a number of barges or launches that failed to take the fort. From this attack to the abandonment of the harbor defenses by Confederate forces, the navy spent its time in identifying and destroying the harbor throat obstructions, engaging in artillery duels with the Sullivan's Island batteries and enforcing the blockade.

Confederate and Union Naval Actions

The Confederate and Union preparations, weapons, and actions discussed in the previous section provide the context in which to narrate the sequence of naval actions at Charleston Harbor. According to archeologist Richard Fox, “Events take place in battle sectors; spread over time, these events constitute episodes. So battle episodes are interrelated in space and time” (Fox 1993:94). At Charleston Harbor these battle sectors were located at the principal physical features of the harbor: throat of the harbor, Main Ship Channel, Maffitt’s Channel, Morris Island, and beyond the 18-foot contour line. The battle episodes spread over the four years of the conflict reflect Confederate efforts to strike at the Union blockaders with their ironclads, semi-submersibles, and *H. L. Hunley* submarine, and Union attempts at blockading and storming the harbor with their ironclads and wooden warships. The naval battle sequences below were the key Union and Confederate actions that occurred on the battlefield. Each reflects the strategies of the combatants to defend and to contend with the harbor defenses from 1861 to 1865.

Union Blockade of Charleston Harbor—10 May 1861 to 18 February 1865

On 10 May 1861, the first Union blockading vessel, USS *Niagara*, arrived off Charleston Harbor to enforce the recent blockade proclamation by Lincoln on 19 April 1861, becoming the first visible Federal presence since the surrender of Fort Sumter (*New York Herald*, 9 May 1861; *Charleston Mercury* 14 May 1861; Browning 2002:10). A day later, *Niagara* captured the first blockade runner, *General Parkhill*, an English steamer that had ignored the decree (Browning 2002:10; Cowley 1879:24). Over the next several months the blockading fleet increased in size with *Minnesota*, *Wabash*, and others. *The Charleston Mercury* reported the masts of the two aforementioned blockaders towered over Morris Island (*Charleston Mercury* 15 July 1861). But Union vessels came and went, and in mid-July two of the three blockaders off Charleston Harbor were ordered to stations off Bull’s Bay and the other to Hampton Roads, leaving only *Wabash* to enforce the blockade at Charleston (*ORN*, ser. 1, vol. 6:13-14). The *Mercury* reported the vessels usually maintained a presence about three miles offshore the bar, although on one occasion the blockader *Vandalia* approached closer than usual to the harbor and Forts Sumter and Moultrie opened fire on the vessel. *Vandalia* responded in kind and then retreated among the other blockading vessels (*Charleston Mercury* 8 June and 25 September 1861).

At first content to maintain the blockade off Charleston, the situation changed when the Blockade Strategy Board recommended securing a lodgment on the coast of South Carolina in the fall of 1861. Under the command of Rear Admiral Samuel F. Du Pont, a Federal naval expedition sailed from Hampton Roads to attack Port Royal. On 7 November 1861, the naval fleet bombarded and forced the abandonment of the two Confederate forts at the entrance to the sound. Later operations secured the town of Beaufort and adjacent waters. The captured harbor permitted the blockading fleet to maintain its headquarters, store ships, a floating machine shop, and other auxiliary vessels to support the efforts of the squadron throughout its domain (Browning 2002:23-42). Finding a limited number of vessels to enforce the blockade, to perform reconnaissance missions, and to participate in joint operations with the army, Du Pont followed another suggestion of the board by agreeing

to block the two main channels into Charleston Harbor, Main Ship and Maffitt's/Beach, with two stone fleets (Browning 2002:52).

The action that helped to precipitate the sinking of the stone fleets was the escape of the privateer *Nashville* from Charleston which was extremely damaging to the credibility of the blockaders off the port. *Nashville* slipped out of Charleston in mid-October 1861 and made its way to Bermuda. Welles ordered an explanation from the captains of the blockaders present during that period. The captain of *Roanoke* explained his ship was anchored off the main ship bar, about a mile and half or two miles closer than any time before. *Vandalia* was situated at the northern channel (Maffitt's), later joined by *Monticello*, which was closer in due to a shallower draft, and *Flag* at the southern, or Lawford Channel (ORN, ser. 1, vol. 6:359). Four vessels were expected to cover a distance of approximately six miles, and to cover five entrances into the harbor, namely Lawford, Main Ship, Swash, North, and Maffitt's/Beach. In early December, the bark *Helen*, a 340-ton clipper laden with 1,100 barrels of rosin and 500 barrels of spirits turpentine left Charleston on the 2nd of December and arrived at Liverpool where the captain reportedly passed through the blockade without seeing a single blockader (*The Charleston Mercury* 21 December 1861). The blocking of two main entrances to the harbor offered a solution to improving the enforcement of the blockade.

In mid-October orders were given by Welles to a naval purchasing agent to purchase New England sailing vessels, primarily old whaling ships, outfit them with sea cocks to let water in, and to load them with granite with the intent to sink them at the harbors of Charleston and Savannah (ORN, ser. 1, vol. 12:416). Approximately 45 ships were purchased, some were laden with granite, but most were loaded with field stones gathered by farmers (Browning 2002:52). The vessels purchased for the stone fleets were an assortment of merchant and whaling ships including *Corea*, originally an armed British transport ship captured during the Revolutionary War, *Tenedos* built in 1806 and mentioned in Herman Melville's poem, *The Stone Fleet* (1861), a lament about the vessels of the stone fleet, and *Garland*, a privateer before becoming a whaler (DANFS). Two separate divisions, numbering 25 and 20, of the vessels arrived off Port Royal and Savannah in early December 1861. A number arrived in sinking conditions, and those in the worst condition were used as breakwaters at Tybee Island. The bark *Marcia* struck and sank on the Port Royal bar. One division of the stone fleet was sent to block the Savannah River entrance, but Du Pont learning of the sinking of vessels by the Confederates below Fort Jackson, and the recent Federal army occupation of Tybee Island at the mouth of the river, made sinking the fleet irrelevant (Browning 2002:53). This contingent of vessels was subsequently used for the second stone fleet off Charleston. Besides use as part of the stone fleets, some of the vessels were diverted for use as store ships in Port Royal, and the *Edward* and *India* were fastened together in Station Creek to form a floating machine shop (ORN, ser. 1, vol. 12:341, 348).

During the period from 17-21 December 1861, Captain Charles Davis, the Union commander in charge of sinking the first stone fleet at the Main Ship Channel bar, sounded the entrance channel to determine the best placement of the obstructions. Two ships were sunk, one at the eastern and one at the western limit of the channel. A total of 16 vessels were sunk, and reportedly placed on the bar in a checkered or indented fashion. The hulks

were intended to lie as much as possible across the direction of the channel, and in several lines apart to overlies each other to prevent a direct line through them. A newspaper correspondent reported the vessels were listing to their port or starboard sides, and others with their bow or stern underwater, and others upright, and heavy swells crashing upon them (*ORN*, ser. 1, vol. 12: 410-424; *Harper's Weekly*, vol. 6, no. 263, 11 January 1862:32). The masts were cut down, and anything of possible Confederate use was stripped, and then in the evening, *Robin Hood* with masts standing proud, was set afire (Moore and Everett 1862:503-508). The Confederates observed the arrival and sinking of the stone fleet at the main bar, and Lee determined that no major Federal attack on the port was contemplated anytime soon, which suggested offensive actions elsewhere. By mid-February 1862, Confederate forces found large sections of the hulks washed ashore (*ORA*, ser. 1, vol. 6:42-44).

On 20 January 1862, the Confederates noticed another Union fleet gathering off the harbor, but this time towards Rattlesnake Shoal. Du Pont had ordered placement of a second stone fleet beyond range of the Sullivan's Island batteries, aiming for the narrow part of Maffitt's/Beach Channel. If the batteries, however, were too strong in that area, then they were to place the obstructions where vessels ran between the mainland and Rattlesnake Shoal, most recently the route taken by the blockade runner *Isabel* (*ORN*, ser. 1, vol. 12:511). From 20 to 26 January 1862, the vessels were sunk at this location, but during a gale one drifted away northward and eastward and sank in shoal waters. In all, thirteen vessels were sunk as part of the Second Stone Fleet, with one escaped outlier between Rattlesnake Shoal and Dewees Inlet Shoal (*ORN*, ser. 1, vol. 12:421-423, 513; *ORA*, ser. 1, vol. 6:43-44; *New York Times* 31 January 1862).

The sinking of the two stone fleets did not solve the problems of the blockaders. They did, however, result in forcing adjustments on both sides of the conflict. The blockade runners main route into the harbor was situated between the Second Stone Fleet and Isle of Palms/Long Island and Sullivan's Island through Maffitt's/Beach Channel. Closure of the Main Ship Channel at the bar forced use of a new entrance over the bar, Pumpkin Hill Channel, slightly north of the main bar. The First Stone Fleet, however, did shut blockade runners out, although it was never a preferred route to begin with. The presence of the stone fleets did affect the battlefield and subsequent naval actions to follow.

A map depicted and an accompanying report described the responsibilities and strategies of each station maintained by the blockading vessels, numbering ten ships and one launch, off Charleston Harbor on 11 May 1862 (Figure 6). Commander Enoch G. Parrott, senior naval officer at Charleston, reported the blockading stations extended from the north at Dewees Inlet and to the south off Stono Inlet, a distance spanning 17 nautical miles. Parrott reported Dewees Inlet as the principal nighttime landmark for the Charleston coast used by incoming blockade runners. Inward bound blockade runners, making the inlet, then turned towards the northern channel, or Maffitt's/Beach Channel, and kept close to the breakers, and at high tide passed within the wrecks of the Second Stone Fleet. Outward bound blockade runners used the same approach but headed to seaward at Dewees Inlet. The two blockaders stationed off Dewees Inlet, *Keystone State* and *Unadilla*, were suited for inshore work due to their shallow drafts and speed. Not shown, but further to the east and offshore of the Dewees Inlet station was a blockader station that provided advanced notice of any incoming blockade

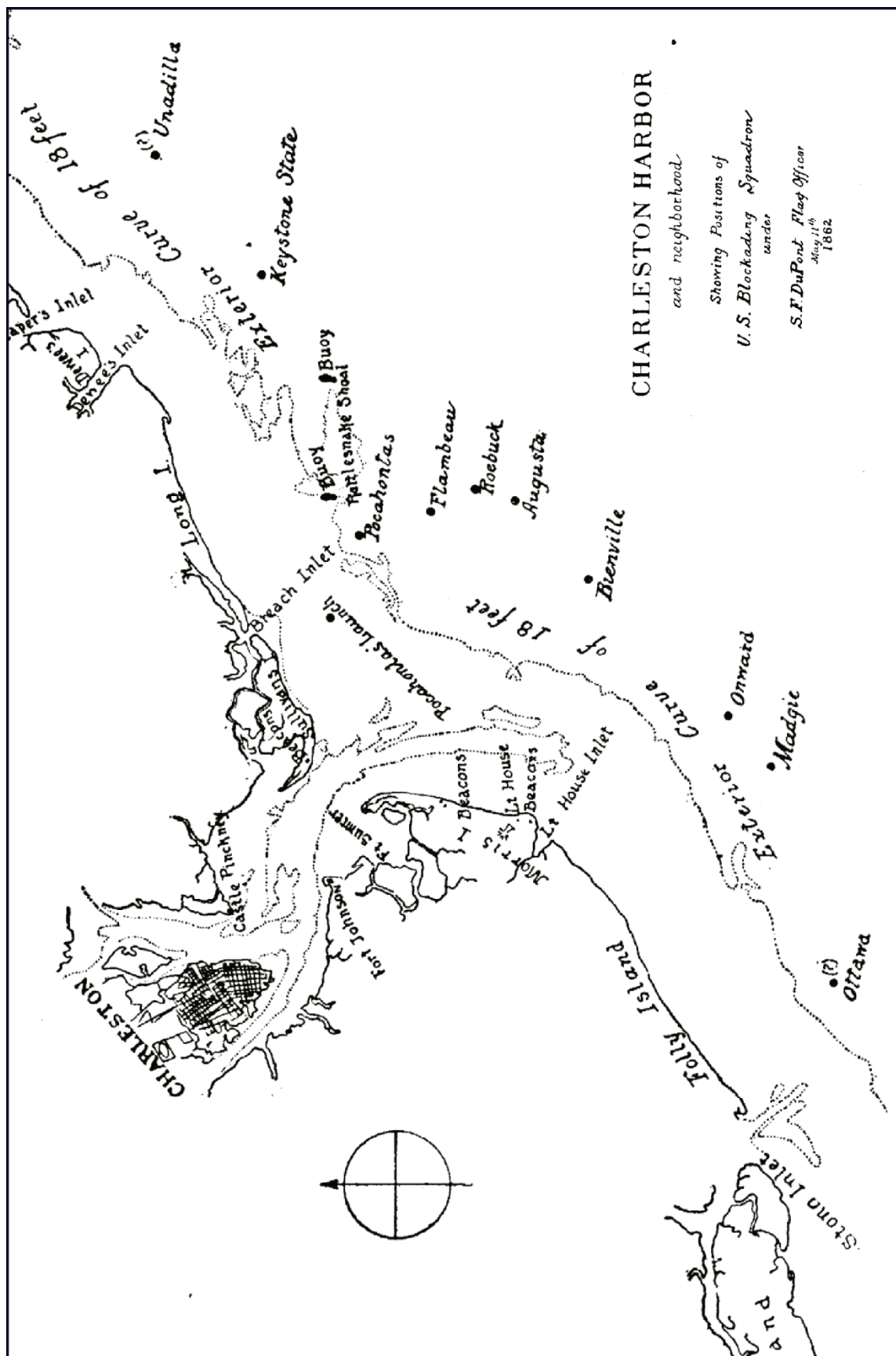


Figure 6: Disposition of blockading fleet on 11 May 1862 (ORN, ser. 1, vol. 12:816)

runners by using signal flares. *Pocahontas*, was stationed as near to the shoals as possible off Breach Inlet, and at nighttime and weather permitting sent a launch closer in to shore. The responsibility of the station maintained by *Pocahontas* was to respond to guns fired at incoming blockade runners by the Union vessels at Dewees Inlet, as well as to provide notice of outgoing blockade runners to the Dewees Inlet vessels. *Flambeau* assisted in an incoming chase, as well as to pursue vessels evading to seaward of *Pocahontas*. The next vessel in line, *Roebuck*, acted as a night signaling platform to the other blockaders to indicate outgoing or incoming evaders, and as a point of reference. *Augusta*, *Bienville*, and *Alabama* (not shown) were stationed between *Roebuck* and *Onward*, which were stationed off the Main Ship Channel. The three aforementioned vessels apparently filled in the gaps between the latter two vessels. *Madgie* was stationed off the Lawford Channel entrance. Another vessel to the south, marked *Ottawa*, was stationed off Stono Inlet, the southernmost inlet available to enter Charleston Harbor via Wappoo Cut. Parrott drew attention to the crescent shape of the blockade, drawn close to shore at the extremes and further away at the middle. The formation was partly a result of the geography of the bar, but also by design by giving the blockaders room to maneuver in pursuit of blockade runners. During the day and especially at nights with high tide, the blockade steamer's boiler fires were kept ready for quick action (ORN, ser. 1, vol. 12:815-818).

Essentially, these stations and strategies remained constant throughout the war, with changes in the numbers of available vessels at various areas, primarily increasing at the northern channel, i.e., Maffitt's Channel. There were also adjustments to the stations based on intelligence gathered from contrabands and deserters from Charleston or to counter successful runs through the blockade. The position of *Pocahontas* noted above was altered a month later to anchor at night about 1,000 yards closer to Breach Inlet off Battery Marshall. The bark *Restless* and steamers *Bienville* and *Huron* were to cruise and anchor nightly to the northeast of Rattlesnake Shoal (ORN, ser. 1, vol. 12:784-785). The blockade runner *Beatrice* had arrived off the port of Charleston in 1864 about 30 miles offshore and spent the day waiting for night. For that reason, Dahlgren ordered the fastest outside vessel to remain in the offing cruising or at anchor just within signal distance of *James Adger*, for the purpose of discovering blockade runners further offshore, scrutinizing passing vessels, and obtaining news, and then return to the station at night (ORN, ser. 1, vol. 16:114). After the sinking of *Housatonic* by *Hunley*, Dahlgren ordered outside blockaders to maintain a constant motion, and if anchored, to have small boats patrolling the perimeter. The steamers were to cruise a small range between two to three miles from each other. In addition, a tug was stationed about a mile and half off Battery Marshall to patrol between Rattlesnake Shoal and Drunken Dick Shoal at the entrance to Maffitt's/Beach Channel from dark to early daylight. In May 1862, this area was patrolled by a launch from *Pocahontas*, but the replacement with a tug afforded more mobility and firepower at this station. The object of the picket was to prevent blockade runners from getting inside or outside of the blockade, to signal the presence of a blockade runner, and to keep a lookout for torpedo craft coming from Breach Inlet (ORN, ser. 1, vol. 15:348-349).

Another change to the arrangement of the blockading fleet occurred with the placement of the monitors adjacent to the north tip of Morris Island at Cummings Point in the summer of 1863. The monitors were assisting in the bombardments of the Confederate

batteries on the island, and consequently their presence and guns aided in supporting the blockade. On 19 July 1863, Dahlgren stated in his diary that with a monitor posted so high up the harbor that the blockade was more effective "...for the trade ceased at once when known that a monitor was so high up" (*ORN*, ser. 1, vol. 14: 367). The completeness of the blockade was maintained by the monitors and *New Ironsides*, and made more effective by placing a monitor well-advanced of Cummings Point, supported by another nearby monitor. The new arrangement was made evident that same night of 19 July when the blockade runner *Raccoon* had succeeded in running past the outer blockade when a shell by the monitor *Catskill* caused the vessel to ground on a shoal. The monitor crews, weary from daily battle at Morris Island, were not as effective during the night to maintain a stringent blockade runner watch. The fall of Morris Island in September 1863, however, permitted the monitors to fully participate in enforcing the blockade, which resulted in no vessels passing in or out of the harbor for several months (*ORN*, ser. 1, vol. 14:600). With the addition of the monitors, the Union blockaders were designated by their position in relation to the bar. A vessel was either considered part of the inside blockade, composed of the monitors and *New Ironsides*, or the outside blockade, comprised of wooden steamers and sailers (*ORN*, ser. 1, vol. 16:112). There was a further distinction of the outer blockade based on their position in relation to the throat of the harbor, and were either on the north line, from Maffitt's/Beach Channel to Dewees Inlet, or on the south line, from North and Swash Channel to Stono Inlet (*ORN*, ser. 1, vol. 13:599).

An important component of the Union blockading fleet was the use of small boats crewed from the blockaders to patrol closer to shore and inside the throat of the harbor during the night. The boats were armed with a 12-pounder or 24-pounder boat howitzer and the crew with rifles and revolvers to deter blockade runners exiting and entering the harbor. At first, as illustrated in the May 1862 map (See Figure 6), the launch from *Pocahontas* and others were used at night, and weather permitting, to patrol closer to Sullivan's Island at the mouth of Maffitt's/Beach Channel. The presence of the monitors in an advanced position permitted Dahlgren to order more adventurous forays of the launches into the throat of the harbor, usually assisted by tugs. There were two types of small boat inner blockaders: Scouts—with the duty of gathering intelligence, cutting obstructions, etc.; and Pickets—looking for blockade runners. The responsibilities of each mission overlapped as warranted. Duty on the launches was a hardship, exposed to sea, wind, and weather, and during stormy weather cruising close to the Sullivan's Island batteries (*ORN*, ser. 1, vol. 16: 34-35, 114). One Union scout, Acting Master John Gifford, was on duty at Charleston Harbor and in the vicinity by Dahlgren's special order from 21 August 1863 to 18 February 1865, and was employed in taking up obstructions and torpedoes (*Report of Secretary of the Navy of 1865*:279). In the early morning of 31 December 1864, a gale started to blow, and the advanced monitor *Nahant* ordered the covering tug to pick-up the six launches operating that morning. A strong flood tide caused two of the picket boats to be drawn inside the harbor and beyond Fort Sumter. The launch carried twelve men, armed with one light 12-pounder howitzer, equipment, and ammunition, 13 Enfield rifles, 14 bowie knives, and other material. Later Dahlgren received a letter from Mate A. Rich, one of the crew, concerning the capture of the launch as they tried to work the boat offshore, but their efforts proved unsuccessful (*Report of Secretary of the Navy of 1865*:306-307; 322-323).

Besides contending with nature and the land batteries, the Union picket and scout boats contended with fellow Confederate picket boats and support vessels. Two deserters from CSS *Indian Chief* in 1864 informed the Union navy that the chief duty of the vessel was to send out two to three picket boats every night. One or two were posted between Fort Sumter and Battery Bee, and another between Fort Sumter and Fort Johnson. They also reported the harbor was full of torpedoes, so much so that the Confederate picket boats felt uncomfortable heading to their posts (*ORA*, ser. 1, vol. 47 (part 1):1017). There were also pre-arranged signals for the Confederate guard boats to ignite Coston lights to signify if an enemy vessel or boat was trying to cut the net obstruction at the harbor mouth. If signals were lit the batteries were ordered to open fire with grape shot (*ORN*, ser. 1, vol. 14:75).

On the night of 5 August 1863, the Confederate steamer *Juno* and CSS *Chicora* set out on a reconnoitering expedition around the harbor. *Juno* had ten armed soldiers aboard, and the vessels were under orders to run down any of the enemy launches they encountered. *Juno* chanced to encounter a launch from USS *Wabash*, with a crew of 23 men, and a 12-pounder howitzer aboard. The Union launch was protecting the right flank of the Federal shore batteries on Morris Island and had drifted into the harbor. The monitor *Catskill* had anchored abreast Fort Wagner to support the operations of the tug and four launches. Their orders were to fire at steamers coming up to Cummings Point, and finding a presumed blockade runner fired their boat howitzer and attempted to board it. Instead, they found the armed vessel *Juno* and under heavy musketry the Union sailors were overwhelmed, with some jumping overboard to escape, and others surrendering to the Confederates. Eight men were rescued from the launch by nearby Union launches. The launch was presumed sunk by the Union navy, but they later learned that it had been captured with thirteen men, and two men missing were supposed drowned (*ORN*, ser. 1, vol. 14:421-423; *The Charleston Mercury* 7 August 1863).

To implement the blockade the Union navy had to contend with two forces: natural and military. In 1862, Du Pont ordered survey work on Rattlesnake Shoal and buoys placed on either side of the shoal to prevent blockaders from running onto them. Once marked, the blockaders were able to position themselves in relation to the shoal to maintain a tighter blockade (*Report of Coast Survey of 1862*:48). Besides underwater obstacles, the ever changing weather and wear and tear kept a number of vessels off the blockade line and in repair, which limited the effectiveness of the blockade (*ORN*, ser. 1, vol. 15:263). In early September 1864 the *Mercury* reported rather boisterous weather "...and the fleet seemed to be having a very rough time of it" (*Charleston Mercury* 8 September 1864).

In addition to situating themselves in alignment with the physical environment, the blockaders had to remain mindful of projectiles—both from Confederate and Union guns. For the most part, the blockaders kept themselves from reach of Fort Sumter and the batteries on Sullivan's Island (*ORN*, ser. 1, vol. 13:599-600). On 7 November 1864, *Pontiac* while retrieving its anchor in the morning was struck in the forecastle by a shell from Battery Marshall. The shell killed six men and wounded seven, and the warship lost its anchor. The guns at Battery Marshall had maximum ranges of approximately 1,600 to 2,700 yards, although the 7-inch Brooke rifle could pitch a shell four and a half miles. The proximity of other armed blockaders was another danger as revealed when *Ottawa* was chasing the

blockade running schooner *Etiwan* on 21 January 1863. During the chase *Ottawa* was fired on three times by *Housatonic*, and by *Powhatan* and *Quaker State*, despite showing the proper signals. As Dahlgren observed the blockade put vessels at risk from enemy or friendly shot, and the shoals (*Report of Secretary of the Navy of 1865*:301-303; *ORA*, ser. 1, vol. 35 (part 2):415, 465; USN 1866:Appendix B. no. 3 xiii; Katcher 2001:21; *ORN*, ser. 1, vol. 13:525-526).

Until the arrival of the first Union blockader on 10 May 1861, Confederate vessels carried a variety of goods at will through the five main channels over the bar. The implementation of the blockade from that day until the abandonment of Charleston Harbor by Confederate forces on 17 February 1865 turned all vessels attempting to enter or exit the port into blockade runners. As noted previously, blockade runners consisted of a variety of sail and steam vessels in the early period, but as the blockade developed, so too did the blockade runners evolve into fast, shallow-drafted, large cargo capacity steamers bent on evading the blockade. With few vessels to enforce the blockade, the first six weeks after the surrender of Fort Sumter, approximately 30,000 bales of cotton were shipped from Charleston, and from June to December 150 vessels, mostly small coastal sailboats and steamers, entered the harbor from the surrounding inlets (Browning 2002:18). From April through May 1863, fifteen vessels entered and twenty-one cleared, and 10,003 bales of cotton were exported (Johnson 1890:72). From November 1861 to February 1865, 116 blockade runners cleared for Charleston, while 131 blockade runners departed from Charleston in the period from October 1861 to February 1865. The vast majority of blockade runners departed and returned to Nassau, with Bermuda next, and several from Nova Scotia. Those departing from Bermuda were usually loaded with CSA government freight (Wise 1988:251-259; 276-281).

In 1861, Confederate vessels carrying letters of marque were outfitted in Charleston to prey upon Union shipping. In June 1861, a Charleston privateer, formerly the pilot boat *Savannah*, armed with a long gun, slipped out of the harbor "...without asking Commodore Stringham's permission..." and captured a northern brig from Portland, Maine carrying a load of molasses and sugar. The ship and cargo was worth approximately \$40,000, which was sent to Georgetown with a prize crew for disposition (*Charleston Mercury* 6 June 1861). The privateer *Dixie*, weighed anchor from Charleston on 19 July and returned 27 August 1861, and during its cruise managed to capture several prizes before returning to Charleston Harbor (*Charleston Mercury* 28 August 1861). The threat of privateers slipping in and out the harbor continued to plague the blockade in 1861, but had mostly petered out by early 1862, with the blockade runners consisting solely of commercially minded ventures.

In the spring of 1862, the *Mercury* reported that the Union blockade of the port was not entirely ineffective. No vessels had for some time entered through the Main Ship Channel, where the First Stone Fleet had been sunk, and was still considered an effectual barrier. A large part of the success of blockade running was based on the skills and ingenuity of the Charleston pilots. As the *Mercury* exclaimed, "A fast vessel, a good pilot, a certain knowledge of the position of your vessel before the day dawns, and not too much fear of Yankee shells, are indispensable requisites, now-a-days, for running the blockade" (*Charleston Mercury* 27 May 1862). Whenever a vessel was running out, small boats

preceded the blockade runner aided by lights along Maffitt's Channel. Incoming vessels relied on pre-arranged signals for guidance or they had pilots aboard with local knowledge. These incoming and outgoing dashes were aided by darkness and fog which enabled them to elude the vigilance of the blockading fleet (*Charleston Mercury* 11 April 1862). A Northern correspondent noted in the fall of 1863 that the nights were dark and hazy after the moonset and "... that it is an utter impossibility to see one of these lead colored steamers, setting low in the water, at any great distance." And despite the vigilance of the blockaders the blockade runners were able to slip into the harbor (*New York Herald* 28 August 1863).

The effective closure and presence of the blockaders in the Main Ship Channel after the sinking the First Stone Fleet, and later with the ironclads taking station in the channel, forced the blockade runners to primarily run through Maffitt's/Beach Channel. Reports from deserters and contrabands throughout the blockade relayed the goings on in the harbor to the Union navy. One topic of constant inquiry was the routes being used by the blockade runners. In the spring of 1862, contraband testimony described that the vessels evading the blockaders sighted the land and squadron just before dark. The blockade runners did not approach or leave the land until observing or reaching Dewees Inlet in order to conceal themselves by the trees or to run them ashore if chased. After dark the vessels were run close into the land, relying on lights from the forts to guide them. Keeping in shoal water and at the edge of the breakers, the vessels passed to the inside of Rattlesnake Shoal. The contrabands reported this was the only channel used by vessels running the blockade (*ORN*, ser. 1, vol. 12:785-787). Concerning the lights of the forts assisting in leading them in, the lights could also confuse a blockade runner as well. In June 1863, the blockade runner *Ruby* got bewildered by the Union lights on Folly Island after steaming through Maffitt's Channel, and navigated through the Main Ship Channel and grounded on a shoal and was destroyed by Union gunfire at Lighthouse Inlet (*Charleston Daily Courier* 17 June 1863). Another attractive feature of Maffitt's/Beach Channel was the protective string of Confederate batteries lining the beachfront of Sullivan's Island that kept the Union blockaders at bay, creating an opening for the blockade runners to slip through. Although on occasion other channels were taken through the bar. In an unsuccessful run departing Charleston on the night of 21 January 1863, the schooner *Etiwan*, laden with 99 bales of cotton and two barrels of rosin, attempted to pass through the blockade using the Swash Channel, but was captured (*ORN*, ser. 1, vol. 13:524-526).

The vast majority of blockade runners eluded the blockaders and carried in much needed military supplies and commercial goods into the Confederacy, and departed laden with naval stores and agricultural goods, namely cotton, for sale abroad. A number were also captured leaving or entering the harbor, and were either forced ashore, deliberately run ashore, or were brought to and boarded. The two cases below illustrate the Union efforts and difficulties in implementing the blockade, and also the strategy of the blockade runners to evade the blockade. Chapter 3 describes additional actions and details leading to the demise of the blockade runners sunk in the waters of Charleston Harbor.

The Union perspective of the events surrounding the blockade runner *Flora*'s entrance into the harbor illustrates the challenges of halting an evading vessel during the night. On the night of 22 October 1864, *Flora* grounded off Fort Moultrie after an exciting

chase through the inner and outer Union blockade. On the evening of 22 October around 9 PM, off to the northward of the inner buoy of Rattlesnake Shoal, USS *Wamsutta* discovered the inward bound blockade runner. *Wamsutta* slipped its anchor, fired at the vessel, and then mistakenly made signal a vessel was outward bound. This caused some confusion to the other blockading vessels as to the blockade runner's course until *Wamsutta*'s picket launch fired the correct signal indicating inward bound. The nearby USS *James Adger* managed to fire a broadside at the passing steamer until it disappeared in a cloud of smoke from *Wamsutta*'s guns. USS *Mingoe*, the fleetest ship in the squadron, was unable to bear its guns on the blockade runner or slip anchor to pursue, and the whole vessel was thrown into confusion as many had not been on blockade duty for long nor seen a blockade runner at night. *Flora* then passed USS *Laburnum* which managed to fire a bow gun on the fleeing prey. USS *Geranium*, the next blockader, moved inshore and discovered the blockade runner off its port side bow and fired two shots and then lost sight of the vessel. At Breach Inlet, USS *Sonoma* and its picket boat closer to shore did not see the blockade runner at all, while the nearby USS *Acacia* slipped anchor and went inshore and randomly fired shots into the darkness. USS *Azalea*, the westernmost vessel of the northern line, believing it had spotted spray from the blockade runner's paddlewheels fired several shots but did not chase as the unknown vessel was too far away. Later *Wamsutta*'s picket boat fired a signal indicating an outward bound vessel, but had mistakenly believed *Geranium* was the offending vessel. Escaping the outside blockaders, *Flora* then encountered the inside picket launches, which fired at the blockade runner causing it to run aground on the southern bank of Maffitt's/Beach channel. Salvaged of some goods by the Confederates, Union monitors and batteries on Morris Island eventually pounded the ship into a wreck (*ORN*, ser. 1, vol. 16:30-32).

An account of *Beatrice*'s attempt to enter the harbor provides insight into the blockade runner's adventure into Charleston Harbor. Between 11 and 12 in the evening of 27 November 1864, bound from Nassau, the blockade runner reached land southward of Charleston. The vessel spotted lights, most likely around the Stono River, and shortly afterwards the Charleston Bar lightship. Bearing north, *Beatrice* steamed east to pass around the lightship and then steered landward off Long Island (Isle of Palms) until reaching 8 feet of water. The vessel drew 6 feet and 8 inches, leaving little margin of error in navigation, and steered along the shore searching for the channel. Headed west towards the harbor, the blockade runner was sighted and then repeatedly fired at, but no shells struck as the vessel picked up speed to evade the blockaders. Then *Beatrice* fell in with another blockader who chased and fired shots with one passing through below decks and aft of the wheelhouse. At full speed the steamboat struck a shoal on the starboard quarter and backed off. Then the vessel grounded again after finding itself surrounded by the Union launches which opened up a heavy fire of musketry and boat howitzers. The captain and others left in a boat, and the remainder of the crew was captured. Boarded by the Union picket boats the vessel was set afire and subsequently declared a wreck (*ORN*, ser. 1, vol. 16:113-114).

Confederate Ironclad Sortie—31 January 1863

On the night 30 January 1863, the Confederate ironclads *Palmetto State* and *Chicora* descended from the harbor by way of the Main Ship Channel to attack the Union blockaders.

Three wooden steamers, *General Clinch*, *Chesterfield*, and *Etiwan* with fifty soldiers accompanied the fleet, but were unable to cross the bar. The attack was timed to coincide with the arrival of the ironclads at high tide to cross the main bar. With a foot of draft to spare, the ironclad *Palmetto State* immediately opened the attack on the closest blockading vessel, USS *Mercedita*, at 4:30 AM the morning of 31 January. The ironclad rammed its prow and fired its 7-inch Brooke rifle simultaneously into the starboard quarter of the wooden steamer. Finding the ship in a sinking condition and at the mercy of the ironclad, the Union commander surrendered the ship to the Confederates. With no support from the wooden steamers to deal with the stricken Union vessel, the Confederate captain arranged a parole to the Union officers and sailors of the vessel who agreed to not take up arms against the Confederacy until exchanged. Hearing *Chicora* engaging the fleet, *Palmetto State* resumed the search for additional blockaders to attack, and engaged in gunfire with several warships. The Union vessels maintained their distance; content with trading shots with the ironclad. In the meantime, *Chicora* crossed the bar at 4:40 AM and commenced action at 5:20 AM by firing upon a blockader. The ironclad then engaged two other vessels, causing USS *Keystone State* to lower its flag in surrender. When sending a crew to take possession of the crippled warship, the officers of the ironclad discovered the Union vessel making an attempt to escape. The Union vessel then opened fire on the ironclad and escaped due to its faster speed. Turning its attention elsewhere, the ironclad engaged with several other blockaders, including USS *Housatonic* at long range. Both ironclads navigated eastward and northward along the line of the blockading fleet. *Chicora* continued the attack before noticing the signal from *Palmetto State* to anchor at Maffitt's/Beach Channel. From their vantage point, the Confederates discerned the blockaders had retreated southwards and eastwards of their usual positions. The ironclads remained at the channel entrance for seven hours before crossing the bar at high tide (ORA, ser. 1, vol. 13:617-623; Parker 1883:293-303; Tomb 2005:58-59).

Aware of the threat the recently constructed Confederate ironclads posed to the wooden blockaders, intelligence obtained by Rear Admiral Du Pont suggested they were meant for harbor duties and had no sea-going capability (Browning 2002:137). With limited trepidation to the wooden blockaders off Charleston, the recently arrived Union ironclads USS *Montauk* and USS *Passaic* were instead directed towards Fort McAllister and Warsaw Sound in Georgia to wait for the anticipated sortie of the Confederate ironclad ram *Fingal* from Savannah (Holden 1863). USS *New Ironsides* had arrived on 18 January and was undergoing alterations at Port Royal (ORN, ser. 1, vol. 13:518; 578). On the night of 30 January, USS *Powhatan* and USS *Canandaigua*, the two heaviest men-of-warships, were at Port Royal undergoing repairs and coaling, leaving mostly lighter class purchased vessels on station (ORN, ser. 1, vol. 13:577).

The Union blockaders at the southern line off the bar of the Main Ship Channel reported a thick haze obscuring the night, the moon having just set, and did not observe the two Confederate ironclads until within hailing distance. *Mercedita*, nearest the Main Ship Channel and lying near the bar, was struck by the *Palmetto State*, with a shell fired from the ironclad passing through the steam drum killing one man and scalding others (ORN, ser. 1, vol. 14:579-581). *Palmetto State* next engaged *Keystone State*, and *Chicora* arriving upon the scene also entered the fray. An exploding shell from *Palmetto State* caused a fire in the

Federal warship, whereupon the commander attempted to ram one of the ironclads. A Confederate shot through the steam drum rendered *Keystone State* temporarily disabled of motive power, and consequently received 10 rifle shells into its hull killing 20 men and wounding others. *Augusta*, north of the fight, presumed a blockade runner was making its escape, and later discerned an ironclad crossing the bar slightly northwards of the main channel at Pumpkin Hill Channel. The vessel made night signals and got underway to join the conflict. *Augusta* joined by *Quaker City*, which had been anchored at the Swash Channel, and *Memphis* directed fire at the ironclad rams, despite receiving several shots to their hulls and rigging. North of *Augusta*, *Housatonic*, also hearing gunfire and flashes presumed they were directed towards a blockade runner. Observing *Augusta* depart its station, *Housatonic* slipped anchor to investigate the commotion. Spying the ram, *Housatonic* started firing at it at some distance and continued the fire until the ironclad reached Maffitt's Channel (ORN, ser. 1, vol. 13:577-615). *Unadilla* on the north end of the line had no knowledge of the ironclad attack until the rams were seen at 8 AM (ORN, ser. 1, vol. 13:599).

Receiving news of the sortie, Du Pont ordered *New Ironsides* from Port Royal to take over command of the blockaders. He wanted the ironclad to anchor in a position to prevent the ironclads from coming out again, preferably inside the bar (ORN, ser. 1, vol. 14:623). Captain Thomas Turner of *New Ironsides* said the vessel had to anchor outside of the bar, especially with the threat of heavy gales during the winter season. Du Pont reported to Welles the blockade was made stronger with the presence of *New Ironsides*, *Powhatan*, and *Canandaigua* (ORN, ser. 1, vol. 13:602).

The Confederates claimed the attack had broken the blockade, legally requiring the re-opening of the harbor for a period of 15 days before re-establishment of the blockade (Browning 2002:142). The Union countered the blockade had never been broken by publishing a letter from an Army troop transport steamer which had stopped at Charleston Harbor en route to Port Royal on the morning of 31 January. An army officer reported finding the blockading squadron intact four or five miles offshore, and that while hazy, land was visible in the distance. The recently captured blockade runner *Princess Royal* was observed as well (ORA, ser. 1, vol. 14: 209). Whether broken or not, a Confederate naval officer noted they had hoped to accomplish more, and as the ironclads entered the harbor, the blockaders returned to their stations (Parker 1883:303).

Union Ironclad Attack on Fort Sumter—7 April 1863

In a desire to strike at Charleston, the Union Navy Department sent all the available and newly-built *Passaic*-class ironclads to join the South Atlantic Blockading Squadron in early 1863. The first monitor to arrive, *Montauk*, was sent by Du Pont to test the Confederate earthen works at Fort McAllister on the Ogeechee River, Georgia and to blockade *Nashville*, the privateer that had run out of Charleston in late 1861. During these operations *Montauk* on 28 February 1863 endured fire from the Confederate fort and successfully sank *Nashville*, which had grounded upriver within range of the monitor's guns. The monitor, however, did not fare well after striking a torpedo, resulting in the captain forced to ground the ironclad to keep it from sinking (Rodgers 1956:33; Browning 2002:158-161). The repaired *Montauk*,

augmented by two newly arrived ironclads, *Patapsco* and *Nahant*, was again directed to test the ironclads against the earthen fort located on an obstructed channel—similar conditions to those at Charleston. Three monitors and support vessels attacked Fort McAllister, and while demonstrating their ability to withstand large caliber cannon fire, the monitors did not materially damage the fort. Du Pont, explaining the results of the attack and the delay in launching the naval attack on Charleston to his army counterpart, Major General David Hunter, noted the deficiencies in the construction of the ironclads, especially the need for strengthening the deck plating and magazines, and the damage done earlier to *Montauk* by the torpedo also made him anxious (*ORA*, ser. 1, vol. 14:427-428). By mid-March, seven monitors, the experimental ironclad *Keokuk*, and the ironclad frigate *New Ironsides* were readied for the attack on Charleston Harbor (Browning 2002:165). Despite Du Pont's misgivings about the success of taking Charleston purely by naval force, political pressure in Washington and the public cry for action against the city, forced his decision to attack with the ironclads.

The gathering fleet of ironclads did not go unnoticed by the Confederates in Charleston. Major John Johnson, CSA, related that all the posts and batteries were looking forward to the contest, not in an overconfident way, but in knowing the defenses of the city were well-prepared (Johnson 1890:44). The throat of the harbor was marked with buoys to assist in determining the ranges of the Union vessels, and an innovation in positioning the ordnance permitted quicker sighting on moving targets. The guns at the throat of the channel numbered 76 of various large calibers. The Confederate gunners were instructed to fire at the leading vessels. Obstructions at the harbor entrance consisted of portions of the wooden boom and several sections of the rope netting. According to Confederate sources, there were no floating torpedoes located in this area of the battlefield, although frame torpedoes were situated at several of the inside channels. There was, however, a boiler torpedo placed adjacent Battery Wagner and in the Main Ship Channel (Johnson 1890:20 60; Beauregard 1878:525-526; *ORA*, ser. 1, vol. 14: 240-244; 257-261). The *Mercury* stated,

The long mooted question of the fighting value of ships against batteries will be brought to a test more conclusive than any to which human warfare has yet subjected it. In other words, the Monitor iron-clads, which the Yankees claim to be the most impenetrable vessels ever constructed, will necessarily come within point blank range of the most numerous and powerful batteries that have ever yet been used in a single engagement...But if, perchance, despite of mazy channel, multiplied torpedoes, and the combined batteries of the forts, some of the nine Monitors should chance to get into port, they would still have to encounter a concentrated fire from other batteries..."(*Charleston Mercury* 11 March 1863).

Much like their antagonists, the Union sailors on the ironclads were also eager to bring on the attack despite receiving daily reports concerning Charleston's "...perfect defenses, the impassable obstructions, the monstrous torpedoes, and the desperation of the enemy..." (Holden 1863:592-593). The assembled Federal ironclad assault fleet departed

North Edisto River Inlet on 5 April 1863 and proceeded to Charleston. Arriving off Charleston, *Keokuk* and the Coastal Survey steamer *Bibb* were tasked with buoying the channel so *New Ironsides*, with the greatest draft, could cross the bar the next morning. *Patapsco* and *Catskill* covered the operations and anchored over the bar that evening to protect the buoys. The First Stone Fleet destroyed the Main Ship Channel entrance, and the Federal navy resorted to using the nearby Pumpkin Hill Channel to cross the bar (*Report of Coast Survey of 1863*:44). On the morning of the 6th, the remaining vessels crossed the bar intending to assault that day. Hazy weather, however, reduced visibility making visual contact with the ranges difficult and the pilots refused to proceed any further. By noon on 7 April, the pilots consented to lead the ironclads into battle. The battle plan called for the vessels to proceed in a single column, about 300 yards apart, with *Weehawken* pushing a torpedo raft leading the way, followed by *Passaic*, *Montauk*, *Patapsco*, *New Ironsides* with Du Pont aboard and the flagship, *Catskill*, *Nantucket*, *Nahant*, and *Keokuk* in the rear (Figure 7). The Union line of battle was based on captain's seniority, and although *Passaic*'s Captain Percival Drayton was senior, the lead was given to *Weehawken* as Captain John Rodgers had agreed to use the torpedo raft to clear the path of obstructions for the attack (*New York Times* 5 February 1893). The ironclads, carrying a total of 32 guns, were not to respond if fired upon as they passed the Morris Island batteries and to reserve their ammunition against Fort Sumter. The fleet was to go within easy range of Sumter or approximately 600-800 yards distant, and stay on the southern side of the channel and away from the Sullivan's Island defensive works. After the monitors reduced Fort Sumter, then they were to attack the batteries on Morris Island. A reserve fleet of wooden vessels remained anchored at the bar to support actions against Morris Island after the reduction of Fort Sumter. The time chosen to reach the Charleston forts was at slack high tide, which would allow any disabled vessel to float out of the harbor on the ebb tide. As the vessels weighed anchor one of the grappling hooks on the torpedo raft entangled *Weehawken*'s anchor line causing over an hour delay, consequently the Union fleet steamed against an ebb-tide (*New York Times* 5 February 1893; Johnson 1890:46). As the fleet moved slowly down the Main Ship Channel and into the harbor throat, numerous buoys in every direction caused the lead vessel to proceed cautiously into the harbor. Around two o'clock, *Weehawken* signaled that a number of obstructions marked by rows of casks were visible between Fort Sumter and Fort Moultrie. The piles extending from James Island to the middle ground were also visible (*ORN*, ser. 1, vol. 14:5-6; 9; *New York Times* 5 February 1893).

At approximately 2:50 PM, Fort Moultrie open fired on *Weehawken*, and then was joined by the batteries on Sullivan's Island, Morris Island, and Fort Sumter. As *Weehawken* turned to avoid the obstructions, confusion down the assault column ensued as the ironclads next in line turned to avoid each other. *Weehawken* became unmanageable with the torpedo raft, and at some point cast it adrift. *New Ironsides* became embroiled with the ironclads, anchoring twice to avoid grounding and after colliding with two of the monitors, *Catskill* and *Nantucket*. This turmoil in the column prevented *New Ironsides* from firing its powerful broadsides at Fort Sumter. Du Pont signaled to the fleet to ignore the actions of *New Ironsides* as it became unmanageable in the strong tide and shoal waters. *Keokuk* went prow onto Fort Sumter and received the concentrated fire of Sumter, Moultrie, Bee, and Cummings Point batteries. When within 900 yards it was struck by a wrought-iron bolt, near its prow, which ripped up a plating six feet in length, which caused the vessel to retire (*ORA*, ser. 1,

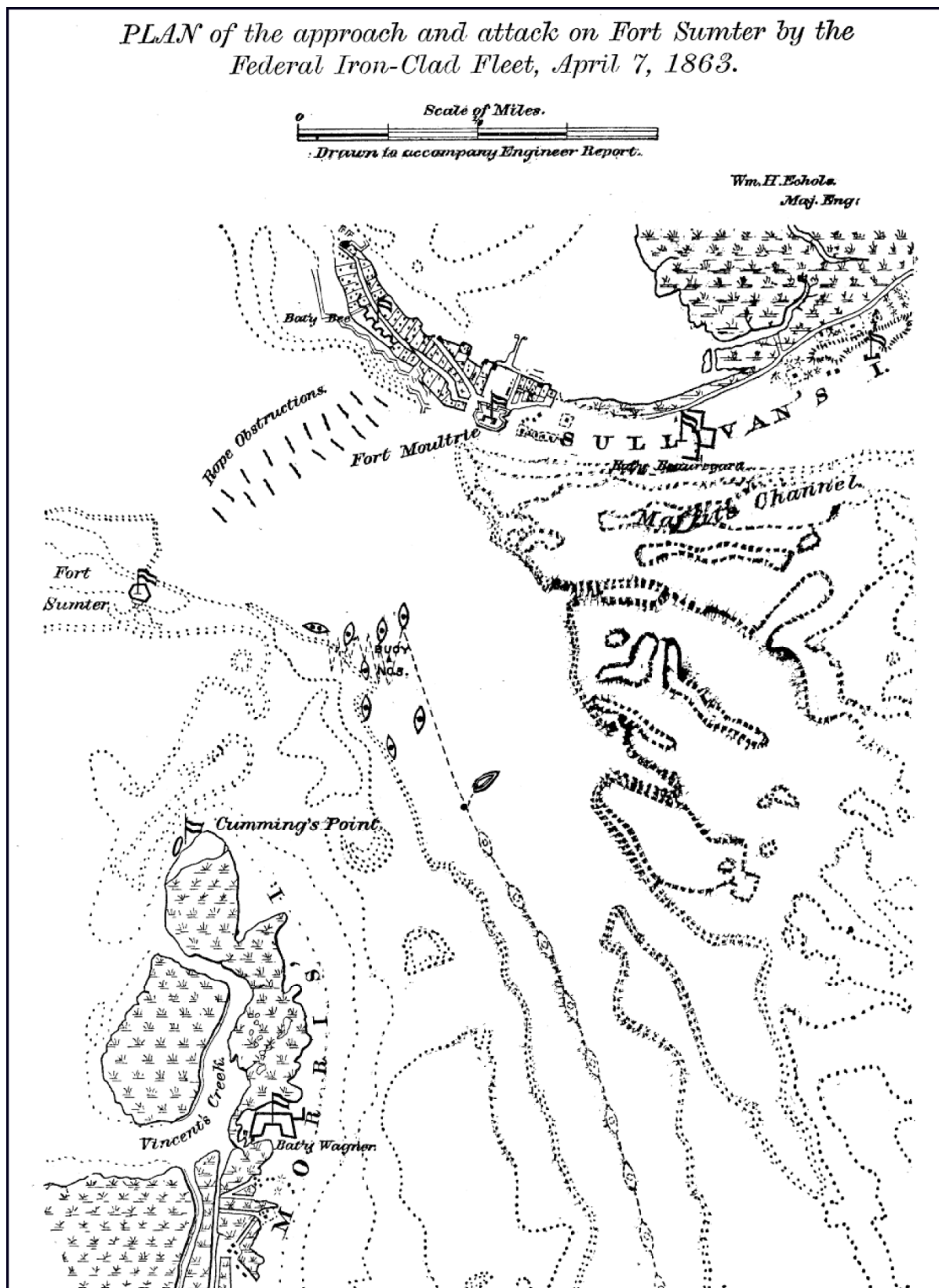


Figure 7: Major W. Echols, CSA, map of the 7 April 1863 Federal ironclad attack on Charleston (ORA, ser. 1, vol. 14:251).

vol. 14:246-256). While bringing a total of 32 guns to the gunfight, the Union fleet only engaged 23 due to *New Ironsides* unavailability and disabling of others. The ironclads fired 139 times with the most fired by *Montauk* and *Weehawken*, 27 and 26 respectively. The vessels suffered one killed and 22 wounded, with the killed quartermaster aboard *Nahant*, and 16 wounded on the riddled *Keokuk* (*The New York Times* 13 April 1863; Johnson 1890:60). At 4:30 PM, Du Pont on *New Ironsides* ordered the monitor fleet to withdraw from the attack (*ORN*, ser. 1, vol. 14:6-7; 17, 28; *New York Times* 5 February 1893). The effects of the firing on Fort Sumter were minimal, having struck the fort at least 34 times, with several shots combining in one area, and superficial damage caused by shell bursts striking and grazing the masonry exterior (Johnson 1890:59).

From the Confederate vantage point, the approaching monitors presented a very low relief in the water, with a freeboard of about 2 feet above the water, although the prominent turret and pilot house offered the main target (*ORA*, ser. 1, vol. 14:246-256). The various commanders were not sure of the plan of the approaching fleet, whether they intended to run past the obstructions or stand and fight. At Sullivan's Island, it became apparent quickly that the Union fleet intention was to fight and not run by, and orders were given to train their guns on the vessels and fire precisely, and although the range was long from Fort Moultrie and the other batteries, the commander believed the cannons inflicted damage to the ships. At Battery Bee, the commander believed the Union fleet intended to run past the batteries and into the harbor, and ordered a rapid fire, but deliberate and well directed. When it became evident that the fleet intended to stay and fight, the firing became slower, but when *Keokuk* advanced the order was given to fire more rapidly (*ORA*, ser. 1, vol. 14:268-274). *Keokuk* approached Fort Sumter the closest, reaching by Confederate estimates to within 900 yards from Fort Sumter, while the other monitors were not less than 1,300 yards. Fort Moultrie, Battery Wagner, and Cummings Point fired upon the fleet at a distance of from 1,200 to 1,500 yards, while Batteries Bee and Beauregard, at a distance of 1,600 to 2,000 yards, were reckoned too far to have inflicted damage to the ironclads. Confederate accounts reported firing 2,209 shots of which the Union reported 520 struck the ships, and Beauregard noted "...a most satisfactory accuracy when the smallness of the target is considered" (*ORA*, ser. 1, vol. 14:241-242, 245). During the battle, *New Ironsides* reportedly lay over the boiler torpedo, but it failed to explode when detonated (*ORA*, ser. 1, vol. 14:257). The Confederates suffered minimal casualties with three killed by an accidental explosion at Battery Wagner and one at Fort Moultrie (Johnson 1890:59). The ironclads *Palmetto State* and *Chicora* steamed behind the obstructions inside the harbor with orders to engage any passing Federal ironclad (*Charleston Mercury* 10 April 1863).

From inside the monitor *Nahant*, the ship's surgeon stationed in the ward room to receive the wounded reported he could "...hear the faint reports of the enemies guns...the balls & shells & bolts rattled like hail upon us; every little while showers of water would fall upon us and down the turret, thrown up by shot striking alongside" (Hill and Stedman 1976:141). From Fort Sumter the view was spectacular,

Upward of one hundred of the heaviest cannon of all description were flashing and thundering together, shooting their balls, their shells, and fiery bolts with deafening sound and shocks of powerful impact that surpassed all

previous experience of war...The water all around the fighting ships was seen on nearer view to be constantly cut, ploughed, and splashed with every form of disturbance, from the light dip of the ricochet shot to the plunge of the point-blank missile, from the pattering of broken pieces of solid shot falling back from the impenetrable turrets to the sudden spout of foam and jet of spray sent up by a chance mortar-shell exploding just beneath the surface of the water (Johnson 1890:52).

Those at Fort Sumter also saw the metal spheres of the monitor's 15-inch shot from muzzle to fort and when they struck the fort "...the massive walls, piers, and arches seemed to tremble to their foundations" (Johnson 1890:56-57).

Damage inflicted to the monitors during the assault was extensive. The after-action reports determined the severe nature of the beating sustained and that five of the monitors were completely or partially disabled. *Nahant* had its turret jammed, and bolts in the turret and pilot house broken by the impact of the shot caused nuts and ends to careen about the spaces and injured the captain, pilot, and mortally wounded the quartermaster in the pilot house. *Passaic* lost use of its 11-inch gun, and the turret jammed briefly but was worked free later, and it almost had its pilothouse roof knocked off. *Patapsco* lost use of its 150-pounder Parrott rifle as some bolts broke on the gun. On *Nantucket* the port-stopper on the 15-inch gun jammed preventing use of that gun during the battle. Other monitors were able to continue firing, although Du Pont was convinced that if they had stayed in the battle much longer they too would have also become disabled (*ORN*, ser. 1, vol. 14:6-7). According to the captain of *Montauk*, the vessel proved difficult to control in the narrow channel due to the limited view from the pilot house which was compounded by the smoke from the guns, rapid enemy fire, and no compass or buoys by which to navigate. The following morning of the 8th, *Keokuk* sank from damages inflicted by the Confederate guns (*ORN*, ser. 1, vol. 14:6, 14). After the battle and in light of the commanders' comments on the effects of the Confederate fire on the monitors, the slowness of fire, and the inability to occupy a battery, Du Pont concluded that a purely naval attack could not take Charleston Harbor (*ORN*, ser. 1, vol. 14:31; *ORA*, ser. 1, vol. 14:442).

The Confederates, unsure of a second assault, prepared to fight again the next day. During the night of the 7th, supplies were replenished, armament shifted to improve the defenses, and Fort Sumter reinforced with troops (*ORA*, ser. 1, vol. 14:257-261; Johnson 1890:56-57). Examination of *Keokuk* on 16 April by Confederate scouts determined that the turrets were pierced by four 10-inch shot and one 7-inch rifle shot, and a wrought-iron Brooke bolt penetrated 7/8s into the hull. Indentations were observed in the iron plating, and several plates were warped and bolts broken (*ORA*, ser. 1, vol. 14:245-246). Beauregard wanted to attack the ironclads remaining at the bar of the ship channel for five days after the battle, but their departure on the 12th thwarted the plan to attack at night with 15 rowboats equipped with spar torpedoes (Johnson 1890:74).

The aftermath of the battle proved the resolve of the Confederates to hold Charleston Harbor, and the limitations of the ironclads. Beauregard accepting the honors of the Confederate defenders remarked,

I thank you for your congratulations on our success here in our fight of the 7th instant with the Yankee monitors. We are just beginning to find out that our victory was more brilliant than we had anticipated; but who could have believed that the struggle with those boasted marine monsters would have lasted only two and a half hours?" (*ORA*, ser. 1, vol. 14:907).

President Abraham Lincoln corrected a visitor who used the word "repulse" in connection with the ironclad attack saying "A check, Sir—not a repulse." The belief in Washington was that British guns sent to South Carolina saved Charleston on the 7th from "her merited destruction" (*New York Times* 14 April 1863). At a meeting with Welles, Fox, Lincoln, and Charles Sumner, a Massachusetts senator, Captain Alexander C. Rhind, commander of *Keokuk* at the time of the attack and delivering Du Pont's official dispatches, remarked after Fox had mentioned the British fleet successfully taking Sebastopol armed with 120 guns,

...if Sebastopol had 120 guns, Charleston has got 1,200 guns. Not in point of numbers, mind you, but in point of strength of position, weight of metal, caliber, and service of batteries...give Charleston a strength equal to 1,200 guns, and you will never take the place with a monitor fleet" (*The New York Times* 5 February 1893).

Du Pont retained command of the South Atlantic Blockading Squadron for several months after the attack, but public outcry about the outcome of the battle, and the Navy Department's lack of public support, caused him to resign his commission and fight for his honor (Browning 2002:210-212). The Federal ironclad assault was the last and only serious naval assault on the harbor defenses. The navy would shift to work in concert with and complement land forces in storming the harbor.

Union Combined Operations against Morris Island—10 July to 6 September 1863

A new Federal strategy emerged with the appearance of two new commanders in the Charleston theater of operations, Brigadier General Quincy Gillmore and Rear Admiral John Dahlgren. Upon assuming command on 12 June 1863, Gillmore met with Stanton, Fox, and Army general-in-chief Major General Henry Halleck to discuss the military affairs at the harbor. The result of this meeting was the formulation of a plan to initiate a series of objectives that would hopefully culminate in forcing the Confederates to abandon Charleston. The plan called for an army assault launched from Folly Island, occupied by Federal land forces since 7 April 1863, against the south end of Morris Island and the reduction of Battery Wagner; and then to demolish Fort Sumter from the newly acquired base of operations. The reduction of Fort Sumter would allow the ironclads to remove the channel obstructions and reach the city. It was also presumed that the city would be evacuated. These actions would be supported by the navy. Fox maintained that the capture of Morris Island would allow for a more effective blockade by permitting the ironclads to lie inside the bar (Gillmore 1865:15-17). On the day Dahlgren arrived to assume command of the squadron in early July, he met with Gillmore about the planned army descent onto Morris Island. The naval part of the combined operations consisted of Dahlgren assembling the ironclads at Charleston Bar to

cover the attacking troops, to prevent reinforcements, and to engage Confederate batteries, particularly Battery Wagner. Additionally, the navy would cover an army feint on James Island by sending gunboats up the Stono River. The fleet of monitors, augmented by *New Ironsides*, was composed of eight monitors until the arrival of *Lehigh* on 30 August increased the number to nine (*ORN*, ser. 1, vol. 14:590-592).

Arriving in Hilton Head in June, Gillmore ordered Brigadier General Israel Vogdes, commanding Federal land forces on Folly Island, to begin building a series of batteries armed with over 50 guns and mortars at the north end of the island within 800-1,200 yards of Morris Island. These works were in preparation for the assault on Morris Island and therefore were constructed by every means to remain unobserved by Confederate forces. In the early morning hours of June, the blockade runner *Ruby*, disoriented in the fog, wrecked in Lighthouse Inlet. Vogdes ordered a small battery to shell the wreck, which quickly retired under Confederate fire coming from the south end of Morris Island. The brief appearance and quick disappearance of the Federal battery to shell the wreck gave the impression to the Confederates that only a small picket force was at the north end of Folly Island—not an invasion force. Brigadier General Quincy Gillmore considered the wrecking of *Ruby* at that time and place a most fortunate occurrence as it distracted Confederate attention to wrecking the vessel day and night, while Union forces completed their batteries in secrecy (Gillmore 1864:26, 296; *New York Times* 9 September 1863; Johnson 1890:84).

Confederate defenses on Morris Island in the summer of 1863 consisted of Battery Gregg at Cummings Point, Battery Wagner, and a detached series of earthworks at the south end of the island. Battery Gregg was a substantial sand battery designed as an outwork for Fort Sumter, approximately 1,390 yards distant. The battery was to protect the fort's gorge from fire from the Main Ship Channel and from Morris Island, in addition to covering the tidal creeks and streams between Morris and James Islands. The battery had two heavy guns: a 9-inch and a 10-in Columbiad, and some lighter guns. Battery Wagner was distant 2,780 yards from Fort Sumter, and stretched just opposite the narrowest part of the island. The battery was designed to keep an enemy from approaching from the south and to keep the Federals beyond a breaching distance of Fort Sumter. The battery was also prepared to withstand exposure from naval fire from the Main Ship Channel. A substantial bombproof protected a garrison numbering approximately 1,400 men from cannon fire. Beauregard ordered two to three heavy pieces at the battery on the Main Ship Channel side and ten to twelve guns of lighter caliber on the land face (Johnson 1890:81-83). At the southern end of Morris Island, fortified in early March 1863, a loose array of batteries and rifle pits were intended to command the northern end of Folly Island, to dispute passage of Lighthouse Inlet, and to oppose a descent on the island and Lighthouse Inlet. The batteries were armed with eleven guns and mortars. Despite lookouts on the ruins of the old lighthouse, the masthead of the wrecked blockade runner *Ruby*, and at Secessionville on James Island, there was no reports of heavy Union activity while they constructed the batteries (Johnson 1890:81-84; Davis 1878:95-96).

Assault on South End of Morris Island—10 July 1863

The monitors arrived off the bar on 9 July ready to engage the enemy at the first signal from the army forces with the purpose of enfilading the Confederate positions on Morris Island. Federal forces attacked the south end of Morris Island on the morning of 10 July 1863 crossing over in barges and boats covered by the batteries established on Folly Island at Lighthouse Inlet (*ORA*, ser. 1, vol. 28 (part 2):11-12). The monitors remained off the bar until the first distinct firings occurred, and led by Dahlgren in *Catskill*, the small flotilla composed of *Montauk*, *Nahant*, and *Weehawken* crossed the bar, most likely using the Pumpkin Hill Channel, and steered for the wreck of *Keokuk*. Passing the sunken ironclad, the monitor flotilla arranged themselves in a line parallel to the southern end of Morris Island in the Main Ship Channel and fired steadily among the Confederate batteries. The suddenness and relentless fire discomfited and overwhelmed the Confederates, or as reported in the *Charleston Mercury*, "Our men were exposed during the whole fight to a murderous fire from the four monitors, who hurled their enormous missiles with telling effect" (Cowley 1879:89). Monitors then closed in upon the island as the shoal water permitted. At about 8 AM, the fleet noticed troops carrying the American flag taking possession of the sand hills. The monitors then directed their fire at the retreating Confederate forces seeking shelter at Battery Wagner. At 9 AM, the attack was checked for the day by Battery Wagner, and the Federal troops maintained a sensible distance from the Confederate earthen work. *Catskill* anchored approximately 1,200 yards from shore, and the other monitors trailed in line southwards. From 9:30 AM until 6 PM, with a break for dinner, the monitors poured a constant fire on the battery, which responded in kind. The Confederates aimed primarily at the flagship, *Catskill*, which received heavy fire from Battery Wagner and Battery Gregg being struck about sixty times. The captain of *Catskill* reported the monitor was "...severely handled, their 10-inch smoothbores doing us the most harm, the rifles generally glancing or striking sideways" (Johnson 1890:91-92). At 6 PM, the monitors retreated lower down the channel for the night. The first phase of the combined operations to take Morris Island was complete (*ORN*, ser. 1, vol. 14:590-592).

Assaults on Battery Wagner—11 July & 18 July 1863

On the morning of 11 July, the Federal army made an assault on Battery Wagner unbeknownst to the navy. Gillmore had not informed Dahlgren of the army's intent, and the navy, therefore did not participate in covering the assault, which was decisively repulsed by the Confederates. Gillmore blamed the repulse on insufficient and dated information regarding the strength of the fortification and had not realized the changes to the island's narrowness at that point when conferring with the map. The army made preparations for a second assault by erecting several batteries approximately 1,000 to 1,600 yards away from Battery Wagner. As the army prepared for the assault, the navy occupied the attention of the battery with a daily beating from the monitors, assisted by the gunboats from long range (*ORN*, ser. 1, vol. 14:592; Johnson 1890:93; Gillmore 1864:34-35).

The second army assault was planned for the evening of 18 July. The monitors and *New Ironsides*, led by Dahlgren in *Montauk*, ascended up the Main Ship Channel that morning and anchored approximately 1,200 yards away from Battery Wagner, which was

near as the tide permitted, and began to fire. Gunboats at long range and shore batteries added their weight of shell and shot on the battery. As the tide rose, *Montauk* kept pressing the attack, eventually closing within 300 yards and point blank range of the battery. Projectiles were switched from shot and shell to grape, causing the Confederates to abandon the batteries parapets. In Charleston that morning, the residents woke up to the usual sounds of the bombardment, but by eleven in the morning, a pronounced rapidity in the firing revealed Battery Wagner was enduring a severe pounding that lasted for eleven hours. The paper reported hearing one report every 27 seconds and estimated the Federal forces had fired 9,000 rounds at the battery (*Charleston Mercury* 20 July 1863). At one time over a hundred guns and mortars were being fired by the Union fleet and land batteries and answered in return by Battery Wagner, Fort Sumter, Battery Gregg, and the batteries on James Island (Johnson 1890:102). Receiving a note from Gillmore about the intent to assault, the fleet continued the fire until darkness when distinguishing between Union and Confederate troops became impossible. The navy watched the battle unfold until 9:30 PM, when silence ensued, and shortly afterwards the tidings of defeat were communicated. Realizing the strength of the Confederate earthen work, the Union military forces prepared to invest the battery through a regular siege (*ORN*, ser. 1, vol. 14:592; Johnson 1890:93).

Investment of Battery Wagner—19 July to 7 September 1863

Failing on their two attempts, the Union military forces resorted to continual land and naval bombardment of Battery Wagner and Battery Gregg and to apply a military engineering solution by building a series of parallels and batteries to take the north end of Morris Island. The domino effect of the Union plan to take Charleston necessitated the fall of Battery Wagner. “Fort Wagner is the key to Fort Sumter, and, once in our possession, Fort Sumter naturally falls, and with it the city of Charleston. The country must be satisfied to allow these events to follow in their natural order” (*New York Herald* 12 August 1863). During the investment of Battery Wagner, as the army dug saps and fortified their advancement through a series of parallels, the role of the navy was to enfilade the batteries of the north end of the island, Battery Wagner and Gregg, to cover the sappers, and to prevent reinforcements to the batteries. Gillmore also sent requests when Confederate fire proved troublesome to the advancing Union sap. The firepower of the monitors restricted the Confederate forces to Battery Wagner which permitted steady progress toward the objective. At night, picket and scout boats of the squadron patrolled along the Main Ship Channel. The navy also assisted ashore by manning the Navy Battery, armed with four rifle cannons, on Morris Island (*ORN*, ser. 1, vol. 14:593-594).

The Confederate plan to defend Battery Wagner relied on the vigorous use of sharpshooters, measured artillery response, and support from the distant batteries in an attempt to slow the Union approach. The garrison at Wagner was primarily shielded in the bomb proofs to repel the anticipated assault, but a portion of the troops manned the parapets during daylight and then all turned out at night to man their battle stations (Hagood 1910:181-182; Pressley 1888:158). Confederate snipers used Whitworth telescopic rifles, English rifles brought through the blockade, to impede the steady advance of the sap and were at times used against the monitors. In revolving their turrets, after a discharge, in order to bring the opposite gun to bear, a man on each side of the turret would for a moment be

exposed, and then complimented with the notice of a sharpshooter (Hagood 1910:184). Gun crews at Battery Wagner maintained a fire at the monitors until silenced by the overwhelming cannon fire, but one 10-inch proved to pack a punch that marked the turrets of the monitors with deep dents (*ORN*, ser. 1, vol. 14:594). The Confederates noted the effective firing of the 10-inch Columbiad kept the monitors at a respectful distance. The garrison asked for more, and received one, which was eventually disabled (Hagood 1910:182). Besides fending off the monitors and land forces, the garrison during the nights repaired the damages made to the battery during the day (Pressley 1888:158).

In late August, the garrison dueled with the wooden gunboats *Mahaska* and *Cimmerone* and "...drove them [Union gunboats] from the position close in they had first assumed, and compelled them to lay off at a more respectful and comfortable position. The fire of Wagner was silenced after an hour firing by the *Ironsides* and the wooden gunboats" (*New York Herald* 28 August 1863). The broadside fire from *New Ironsides* was particularly damaging to Battery Wagner:

The New Ironsides, which since Monday had taken but little part in the bombardment, now came up, with a couple of Monitors, and from ten till two poured into the ragged fort a tempest of shells that completely silenced every gun. A neat way the gunners on the Ironsides have of exploding their projectiles within the fort. It is impossible to drive them through the sand and cotton of which the work is made, nor can the guns be so elevated as to toss them in as from a mortar. So the pieces are depressed, and the shot, striking the water about fifty yards from the beach, jumps in. In nearly every instance this manner of making the missiles effective is successful. 'These are what I call billiards,' said the captain, watching the firing. 'They carom on the bay and beach and pocket the ball in the fort every time' (*New York Herald* 28 August 1863).

At various stages of the tides in the Main Ship Channel, the Federal vessels swung at their mooring broadsides to the channel, and consequently were pointed directly towards Morris Island. This proved troublesome for *New Ironsides* with its unprotected bow and stern, along with the inability to use the broadside guns against the Confederate battery (*ORN*, ser. 1, vol. 14:599).

The Confederates in Battery Wagner were able to observe "...the huge projectiles coming straight for the spectator could be seen from the time they left the gun—presenting the appearance of a rapidly enlarging disk as they approached" (Hagood 1910:188). And in mid-August a northern correspondent reported on the firing on Battery Wagner by the wooden gunboat *Ottawa* and one monitor commented "...the air, impregnated with sulphurous fumes, was alive with the whistle of solid shot, the hum of shell, the shriek of rifle projectiles, and all that variety of strange sounds that proceeds from a hundred flying missiles" (*New York Herald* 12 August 1863) (Figure 8).

With completion of the 5th parallel, the Union sappers started to encounter the Confederate defenses of Battery Wagner including torpedo mines, as well as dead comrades



Figure 8: Top—Morris Island beach looking northwards towards New Ironsides and monitors firing on Battery Wagner; Bottom—Detail showing New Ironsides and monitors (Library of Congress image).

from the 18 July assault. Final operations commenced on 5 September when 17 mortars, 13 heavy Parrott rifles, and *New Ironsides* and the monitors started delivering blows at the fort. “For forty-two consecutive hours the spectacle presented was surpassing sublimity and grandeur” (Gillmore 1864:68-73). Battery Wagner returned fire with intermittent cannons and sharpshooters, along with the guns from Fort Moultrie, Fort Johnson, and the batteries on James Island and Sullivan’s Island. As a Confederate officer reported on all the cannons and mortars blazing away,

made an artillery fight the fury and grandeur of which can hardly be conceived. It is beyond my powers of description, surpassing the most highly-colored accounts which I have ever heard. No words in the English language can exaggerate it (Pressley 1888:160).

During the fire fight, Union sappers moved rapidly forward towards Battery Wagner. By 6 September the army was ready to attack at low tide on the morning of the 7th. Learning from the failed 18 July assault when the fire was halted and which signaled to the Confederates the intent to begin the attack, the fire this time would continue until Union troops mounted the parapet. At midnight of the 6th the Union army learned that Confederate forces had evacuated Morris Island (Gillmore 1864:68-73).

Beauregard had ordered the evacuation after determining the north end of the island was no longer tenable (*ORA*, ser. 1, vol. 28 (part 1):88-90). Battery Wagner and Gregg withstood 58 days of relentless Union military pressure, and after the war Major Johnson surmised that Battery Wagner offered Beauregard three weeks by which to perfect the defenses of James Island and the inner harbor (Johnson 1890:153-154). The Union forces also realized that each day Battery Wagner held was vital to improving Charleston’s inner harbor defenses by Confederate forces. Fort Johnson was improved greatly and transformed into an impressive fortification, along with improvements to Moultrie, batteries ringing the inner harbor were erected, and improved obstructions made the Charleston inner harbor defenses formidable (*ORN*, ser. 1, vol. 14:593). To honor fallen Federal officers from the failed 18 July assault on Battery Wagner, the former Confederate batteries were subsequently renamed Strong (Gregg) and Putnam (Wagner) (Gillmore 1864:42). The Federals re-strengthened the former Confederate works as well building additional forts including Fort Shaw on the south end of the island, named after Colonel Robert Shaw, commander of the 54th Massachusetts Volunteer Infantry Regiment (Johnson 1890:168).

Union Combined Operations against Fort Sumter—16 August 1863 to 17 February 1865

Following the failed assault of Battery Wagner on 18 July 1863, Gillmore changed the order of operations. Rather than reduce Battery Wagner and the north end of the Confederate defenses first, and then demolish Fort Sumter for the ironclads to pass through, Gillmore attempted to conduct both objectives simultaneously. The intended results would hasten the monitors entry into the harbor; and even if the monitors failed to reach the inner harbor, then the taking of Morris Island would at least allow for a more effective blockade. Additionally, silencing the guns of Fort Sumter would prevent them from hindering the

sapping operations (Gillmore 1864:42-43; Davis 1878:99). Federal engineers commenced work on the night of the 25th of July, and by the 16th of August the batteries were completed to begin bombarding Fort Sumter. The batteries totaled eight in number, with the nearest one 3,400 yards from Sumter and the farthest 4,235 yards. The batteries were armed with Parrott rifles comprised of one 300-pounder, six 200-pounders, nine 100-pounders, two 30-pounders and four 20-pounders. These were augmented by two 84-pounder Whitworths captured from a blockade runner, and mounted in the naval battery (Davis 1878:99). Once Fort Sumter was demolished, the monitors and other ironclads could remove the channel obstructions unmolested by Fort Sumter and consequently enter the harbor. The barbette guns on the parapets at Fort Sumter were a prime target to destroy due to their plunging fire on the Union warships. The navy would assist by firing at Fort Sumter from the harbor entrance off Cummings Point (Gillmore 1864:15-17; 57).

In anticipation of a Federal attack, the Confederates in Fort Sumter removed a number of heavy guns from Fort Sumter after the 18 July assault on Battery Wagner, strengthened the gorge, the side facing Morris Island, with sand and cotton bales, and the wharf was relocated towards the Charleston side of the fort (Johnson 1890:108-112). During the period from 16 July 1863 until abandoned on the night 17 February 1865, Fort Sumter endured three great bombardments and eight minor ones, and a naval small boat attack. Basically, the fort changed from a Citadel to an exposed outpost, nearest the Union forts and batteries. At no time did Beauregard give countenance to surrendering Fort Sumter, and it became a post of honor (Johnson 1890:154-155).

Bombardments of Fort Sumter—16 August 1863 to 17 February 1865

On the 12th of August 1863, Union gunners began testing the ranges to the fort, resulting in one shell striking the parapet and knocking down a quantity of bricks, which fell atop a steamer lying alongside, breaking off its smoke-stack. The regular bombardment was opened on Fort Sumter at sunrise on the 17th and continued without cessation from day to day, until the 23rd (Davis 1878:101-102). The Naval Battery commenced firing that same day and continued to the 23rd. The battery consisted of two 200-pounder Parrotts and two 80-pounder Whitworths. The Whitworths were fired until on the 19th one was disabled and the other one continued for two more days until a shell prematurely burst killing four men (LOC-Remey; Gillmore 1864:310). The monitors *Passaic* and *Patapsco* directed their fire at the fort, while the other ironclads pounded Battery Wagner. On 21 August, Gillmore demanded the surrender of Fort Sumter or he would order the bombardment of the city. Beauregard answered in the negative and Gillmore opened fire with the Marsh Battery, or Swamp Angel on the city. The battery fired into the city until bursting on the 36th shot (Gillmore 1864:312, 315). At 3 AM on the morning of the sixth day of bombardment, five monitors *Weehawken*, flagship, *Montauk*, *Nahant*, *Patapsco*, and *Passaic* anchored about 800 yards away from Fort Sumter and opened fire under cover of a foggy morning. The monitors fired about 50 shot and shell at the fort, and Sumter responded by firing the 11-inch Dahlgren gun recovered from the wreck of *Keokuk* and others. This was the last time the heavy guns of Fort Sumter were fired (Johnson 1890:129-130).

To Federal eyes, the fort was destroyed for all offensive purposes and was a shapeless heap of debris, with arches exposed, and the gorge and sea walls breached in many places. The Union artillery threw approximately 6,250 projectiles at the fort (Davis 1878:101-102). The guns at Fort Sumter were not completely disabled until 1 September (Johnson 1890:119). At least two monitors would station off the east face or sea-face and throw their shot or shell squarely at the fort. Reducing the forts walls along with the land batteries created a slope out to the water as well as a slope of debris in the interior of the fort (Johnson 1890, 171). The guns that were dismounted in Fort Sumter and lost in the rubble were recovered by the Confederates with great effort by hoisting them over the ruined walls. The guns were then dropped onto a bed of sandbags prepared below and then floated away at night (Johnson 1890:139). Major Johnson, CSA, chief engineer, noted that Fort Sumter was not designed to withstand "...ordnance as 200 pound Yankee parrots," and that his job was to make "From out of chaotic ruin...to bring forth system and strength" (SCHS-Johnson). On the inside of the fort, Johnson and the Confederates fortified the interior walls with gabions filled with sand and earth. Additionally, Johnson mentions to Echols the availability of the palmetto logs of the Floating Battery which may have been partially dismantled to strengthen the fort (SCHS-Johnson).

On the night of 1 September, the Federal ironclads again approached Fort Sumter. At 11 PM six monitors, with Dahlgren on *Weehawken*, took position about 700 to 1,500 yards off the fort and opened fire on it. The monitors were later joined by *New Ironsides* which came within 1,500 yards. The guns from Sullivan's Island and Battery Gregg opened on the ironclad fleet. The contest lasted for approximately five hours, with the Union fleet having fired about 245 shots and sustained 71 hits. The ironclad fire was very effective and breached the walls in several places. Fort Sumter did not respond as there were no serviceable guns available (Johnson 1890:140-142). The *Mercury* reported on the battle that the stillness of the night allowed city residents to hear the reports of the 15-inch guns as never heard before,

The monitors, it is stated, were struck possibly one hundred times. The impingement of the shot against their mailed sides produced sounds like the deep thud of distant cannon through a heavy atmosphere. Sparks of fire, visible even in the city, were elicited by every blow which they received (*Charleston Mercury* 2-3 September 1863).

As part of an effort to take Fort Sumter right after the fall of Fort Wagner on the night of 6 September, Dahlgren ordered *Weehawken*, to pass in by the winding channel off Cumming's Point, so as to cut off communication from that quarter. *Weehawken*, however, grounded during the mission on the morning of the 7 September in 11 feet of water in the narrow channel between Fort Sumter and Cumming's Point. *New Ironsides* and the monitors started a covering fire at 6 PM that day against the gun batteries on Sullivan's Island. Firing stopped around 9 PM when Union vessels withdrew to help *Weehawken*. On the morning of the 8th, the Confederates discovered the nature of *Weehawken's* dilemma and began heavy firing from all nearby batteries. To help divert the Confederate batteries attention on *Weehawken*, at about 11 AM, *New Ironsides*, *Patapsco*, *Lehigh*, *Nahant*, *Montauk*, and *Passaic* came to anchor about 900 to 1,400 yards distant from Fort Moultrie, and for three

hours delivered the heaviest fire to date from the naval force off Charleston Harbor (Figure 9). *Weehawken* was eventually floated off with minor injuries, including a hole pierced through its hull (*ORN*, ser. 1, vol. 14:549; Johnson 1890:157-159). Later that night of 8 September, Dahlgren ordered a small boat attack against the fort. Ill-planned, the Federal assault was decisively repulsed by the fort's defenders (See following section for more details concerning this episode).

After the refortification of the batteries on Morris Island by the army, the Union forces resumed firing on Fort Sumter on 26 October with the object to complete its destruction and drive the garrison out. This second great bombardment continued until the 6th of December, lasting 41 days with varying degrees of severity. On 26 October 1863 and subsequent days, *Patapsco* and *Lehigh* were sent to bombard Fort Sumter with deliberate fire with their rifled guns at a range of 2,000 yards, and out of range of effective fire from Fort Moultrie and the batteries on Sullivan's Island. *New Ironsides* assisted with its broadsides. On 2 November, *Patapsco* reported engaging against Fort Sumter at a range of 1,800 yards with cooperation from army batteries on Morris Island, formerly known as Gregg and Wagner. The firing took place during a flood tide which was troublesome, but still managed to burst every shell within or upon the fort. The monitor concentrated its fire on the northeast face of Sumter, and with army batteries caused walls to crumble. *Patapsco*'s captain exclaimed, "The explosion of the fifteen-inch shells fired with 5" and 20" [second] fuzes [sic] in the inside of the fort, is hardly describable, throwing bricks and mortar, gun-carriages, and timber in every direction, and high into the air." During the firing two landsmen, a sponger and loader, were killed due to premature explosion of a cartridge in the rifle gun. The increased intensity of the Union fire caused the Confederates to prepare for another anticipated boat attack (*ORN*, ser. 1, vol. 15:76-78; LOC-Kloeppel).

Shorn of their heavy guns, the Confederates in Fort Sumter relied on sharpshooters armed with Whitworth rifles with telescopic sights to fire at the Union artillerists on Morris Island, about 1,300 yards distant. To prevent another boat attack, the Confederates stationed a log boom off the fort, placed wooden and wire entanglements at foot of the exterior slope, and positioned several mountain howitzers on the broken walls (Johnson 1890:173-174). During a lull in the Union firing at the fort from late September to late October 1863, the Confederates constructed a log and sand earthwork, called Thee-gun Battery, situated outside of the forts to serve as crossfire with the batteries on Sullivan's Island. The guns of the battery also protected the channel and guarded the obstructions. Later in the spring of 1864, the battery was separated into two distinct three-gun batteries and were subsequently renamed the East and West batteries (Johnson 1890:169-170, 202-205). On 20 April 1864 Beauregard was recalled to Northern Virginia and command of Charleston fell to Major General Samuel Jones (Johnson 1890:206).

A new Federal commander, Major General John G. Foster, present at Fort Sumter in 1861, assumed command of the Union army on 26 May 1864. The ironclad fleet diminished with the departure of *New Ironsides* present off Charleston since April 1863. The spar torpedo damage done eight months earlier finally necessitated repairs up north (Johnson 1890:211). Foster launched the third great bombardment on 7 July 1864 which lasted until



Figure 9: Top—Monitors and New Ironsides attack Fort Sumter on 8 September 1863 (Cook); Bottom—Fort Sumter in 1865 (Library of Congress image).

the first week of September, lasting approximately 60 days. The Federal aim was to continue demolishing the fort. This would prevent the Confederates from strengthening the fort (Johnson 1890, 224-235). On 28 July 1864, the Union sent two explosive rafts to breach the fort's walls, an explosion in the evening occurred at the southwest angle, or the harbor side of the fort, then another attempt was made on the east angle the same evening (Johnson 1890:232-234). Suffering occasional firing by the land batteries and monitors after that date, the fort was held by the Confederates until abandoned in the evening and morning hours of 17-18 February 1865.

Navy Barge Attack on Fort Sumter—8-9 September 1863

Concurrent with the monitor attacks on Fort Moultrie and the Sullivan's Island batteries, Dahlgren ordered an attack against Fort Sumter on the evening of 8 September. Dahlgren believed the ruined fort was indefensible due to the severe damage caused by the Federal bombardment. A force small of boats laden with officers and sailors was assembled to take the fort. Concomitant with the navy plans, the army was also preparing a small boat attack on Fort Sumter with two regiments. Apprehensive of the two forces mistaking each other for the enemy and not entirely comfortable with the navy storming a fortification, Gillmore pulled back his troops from the attack. The navy boats were assembled at Lighthouse Inlet and then towed by tug down the Main Ship Channel and close to Fort Sumter where they were cast-off to row on their own to make the attack. Major Stephen Elliot, CSA, commander of Fort Sumter, had been expecting the navy barge attack from intercepted Federal signals, the code which had been cracked since mid-April 1863, and stationed his men at the parapets and in reserve to reinforce where needed. At 1 AM, the Confederates observed the navy barges to the east formed in two divisions move towards the northeast angle and the southeast angle. The Confederates reserved fire until the first Union boats landed and launched a fusillade of musketry and hand-grenades on the sailors. The outer Union boats opened fire, and those sailors that had landed headed for refuge in the masses of rubble, but were soon dislodged by grenades. Fort Sumter also threw up signal rockets that were immediately responded by firing from the batteries on Sullivan's Island and James Island. The Confederate ironclad *Chicora* provided an effective enfilading fire by moving about the fort to prevent reinforcements. Overwhelmed, the landed Federal sailors called for quarter and surrendered, while the remaining boats retreated in confusion back to the fleet. The conflict lasted for approximately twenty minutes. The army had assembled its boats and was moving towards Fort Sumter when the engagement commenced. The officer in charge was under orders to halt his progress if the navy arrived first and consequently returned to Vincent's Creek. A number of Union officers and sailors were killed, wounded, and captured in the failed assault (*ORN*, ser. 1, vol. 14:606-640; Pressley 1888:164; Cowley 1879:110; Johnson 1890:160-164; Browning 2002:254-258).

Confederate David Attack on USS *New Ironsides*—5 October 1863

On a dark, hazy night on 5 October 1863, the *David*, under command of Lieutenant William Glassell, CSN, departed Charleston Harbor on the ebb tide to attack *New Ironsides*. The ironclad frigate was a prime target due to its effective fire against the Confederate

batteries, especially during the bombardment of Battery Wagner. Steaming along the Main Ship Channel, just inside of the bar, with a low profile and painted a bluish color, the watercraft passed unobserved through the Union picket boats, the monitors, and other vessels of the inner blockade. *David* arrived abreast of *New Ironsides* about 8:30 PM and then waited for 30 minutes for the flood tide to make, which was delayed by a north wind (Glassell 1877:230; *ORN*, ser. 1, vol. 14:10-21). Appearing on the starboard side from seaward, the vessel was spotted and hailed by the crew of the Federal warship, getting in return several shotgun blasts. Acting Ensign Charles Howard, USN, was killed by a shot from the torpedo vessel. *David* persevered through the small-arms fire and succeeded in detonating the torpedo, loaded with sixty to seventy pounds of powder on a 10-foot spar and six feet underwater, against the side of the hull of *New Ironsides*, near gun port number six. An immense column of water ensued from the blast and covered the *David* and extinguished the steamer's fire. Receiving grape and musketry fire, Glassell and the fireman jumped overboard and were later rescued by a Federal supply vessel. The engineer and pilot, also had jumped overboard, but instead returned to the *David* and restored power and brought the vessel back to the harbor. Despite the successful implementation of the Confederate semi-submersible's mission, *New Ironsides*, while damaged, maintained its position on the blockade. Initial inspection of the hull indicated minimal damage. A more thorough inspection at Port Royal, following the removal of coal from the bunker, revealed damage was greater than it first appeared. Inside the hull, several knees and ceiling strakes were dislodged and cracked with damage visible for over 40 feet, and divers determined the outer hull was damaged for a depth of six feet and about 10-12 feet in length. The ship carpenter recommended docking the vessel to make repairs. Beauregard believed the torpedo failed to sink the ironclad due to the smallness of the charge, the thickness of the hull at that spot, and that the sides of the warship were nearly vertical at that point which allowed the charge blow up alongside the ship. *New Ironsides* remained at station until ordered to Philadelphia for repairs in May 1864 (*ORN*, ser. 1, vol. 14:10-21; Beauregard 1878:517-519; Cowley 1879:114; *DANFS*).

H. L. Hunley attack on USS Housatonic—17 February 1864

The privateer submarine had arrived in Charleston from Mobile, Alabama on 12 August 1863 in an attempt to strike at the Union blockading fleet. The crew of the vessel was composed of the fabricators and investors of the submarine. Shortly after their arrival, a private firm heavily invested in blockade running sent a note to the crew offering sums of money for the successful sinking of *New Ironsides* and *Wabash* each worth \$100,000 and for each monitor \$50,000. By mid-August the submarine had made three night voyages to attack the fleet. The unsuccessful outcomes of the attacks and the perceived tentativeness on the crew to deploy the submarine forced the hands of the military authorities to effect a change of command. With Battery Wagner under siege, Charleston under fire from the Swamp Angel, and Fort Sumter under attack by monitors, Confederate military authorities commandeered the submarine on 23 August and turned over management to the navy (Ragan 2005:45, 51-52, 54, 64).

Three days later, with a naval officer at the helm, Lieutenant John Payne, CSN, the submarine had a new volunteer crew. On 29 August, disaster occurred when it sank

unexpectedly at the Fort Johnson wharf and claimed the lives of five of the nine man crew. The submarine was recovered a week later, and cleaned and towed to the city. H. L. Hunley petitioned Beauregard for the chance to operate the vessel which was accepted. Assembling a crew experienced with the submarine from Mobile, including army Captain George Dixon, CSA, Hunley's crew began operations during the first week of October. Under Dixon's command, the submarine rapidly became proficient in diving under a vessel while towing the explosive torpedo. On 15 October, for some inexplicable reason, H. L. Hunley assumed command of the vessel in Dixon's absence that day, and the submarine and eight-member crew failed to surface after a training dive (Ragan 2005:68-69, 84-85, 91, 116).

By mid-November, the submarine was once again recovered by divers and readied for operations with Dixon at the helm and a new volunteer crew of eight on the hand-cranks. The submarine was apparently under army management at this time. The submarine torpedo boat also received its name, *H. L. Hunley*. Training resumed promptly and by 14 December Beauregard issued orders for all military branches to assist Dixon in his preparations to attack the fleet. The first night out beyond Fort Sumter proved tricky for navigating the submarine in strong currents, and the floating torpedo, filled with ninety-pounds of powder, approaching perilously close to the vessel. Besides the delicate nature of navigating a submarine with a towed torpedo, hand-cranking the submarine from Mount Pleasant to beyond the harbor proved physically demanding. Dixon obtained cooperation with the navy to tow the submarine by a *David* past Fort Sumter and then cut loose to continue the mission. This cooperation almost ended in the destruction of both vessels when the floating torpedo line got entangled with *David's* propeller and drifted towards them. Navy cooperation ceased after that incident. In early January 1864 the Federal monitors began deploying a protective barrier to encircle the vessels, and to maintain an increased vigilance that thwarted the submarine's intentions to sink one of them (Ragan 2005:122-153; *ORN*, ser. 1, vol. 15:334-335).

In early January 1864, intelligence obtained from two Confederate navy deserters knowledgeable about the submarine, and the success of the *David* previously, prompted Dahlgren to issue orders for the monitors to prepare a defensive barricade. The monitors were instructed to fashion a protective enclosure made of wooden fenders with nets weighted down by shot. Additionally, their small boats were also ordered to patrol the perimeter, and to have on deck two 12-pounder light boat howitzers loaded with canister on the decks. Calcium lights to sweep over the water during the night were also ordered. During clear or rainy weather the tugs and picket boats were to maintain a constant watch for these vessels. Dahlgren ordered another precaution for the monitors to anchor in shallower water to restrict passage of the submarine underneath their bottoms, and in case they were struck and sunk, to permit easier salvage operations. Another precaution was to anchor less significant supply vessels alongside the monitors and *New Ironsides* to form another barricade against the floating torpedo. After ordering this extra vigilance to protect the monitors, "...they are the bulwark of the Union in this quarter," Dahlgren reported later that month that approaching a monitor in the dark "...was indeed dangerous...as they fire on the instant." Each was encircled in their protective barricade, along with tugs and cutters patrolling the perimeter and scout boats further out in the harbor (*ORN*, ser. 1, vol. 15:226-239). The 4 February 1864 edition of the *Charleston Mercury* reported that two monitors stationed about 2,000

yards from Ft. Sumter had beams projecting on the sides of the vessels to protect from torpedoes. A dispatch from the Navy Department warned of a plan to strike at the fleet, although Dahlgren believed the plan was aimed at the monitors, and that the outside blockaders were too distant a target. He did however order vigilance on the part of the outside blockaders, and sent information to them of the monitor's defensive arrangements (*ORN*, ser. 1, vol. 15:241).

This extra vigilance by the monitors and inside blockaders forced Dixon and the submarine to aim at a new target—a wooden blockader further offshore. On 10 January 1864, the base of operations was removed from Mount Pleasant and relocated to Battery Marshall at Breach Inlet. The focus of the submarine switched from monitors to the wooden steamer *Wabash*, a vessel reportedly lying 12 miles offshore. The weapon delivery system was modified as well, and instead of deploying a floating torpedo, a Singer torpedo was affixed to a spar, the favored system by Beauregard. Fastened to the torpedo was a harpoon tip by which the submarine could ram the explosive into the wooden hull. Backing away from the ship, a triggering device set inside the torpedo and attached to a 150-foot lanyard on a reel would detonate when taut. By 19 January, the submarine was ready to strike at the fleet after a week of practicing with the new weapon arrangement. The submarine attack plan was to sight a blockader and then proceed in that direction, come up for air and re-sight, and continue in this manner until launching the final run submerged below the water and aiming at the counter of the hull, i.e., the stern area. During the timeframe from early January to mid-February, although the period was marked by severe winds, the submarine usually went out seeking blockaders four times a week, departing on an ebb tide and returning on a flood tide, on the lookout for relatively calm seas and moonless nights. The darkness permitted the submarine to surface and draw in fresh air and to re-sight the target (Ragan 2005:153-196). In February 1864, the blockaders outside the bar consisted of six steamers and one sail, most likely stationed as diagramed in May 1862. *Housatonic*, armed with eleven guns was stationed at North Channel and south of Maffitt's/Beach Channel, created an effective obstacle to blockade runners, and a choice target for the submarine (*ORN*, ser. 1, vol. 15:324-325; vol. 12:815-818; Beauregard 1878:520).

At approximately 8:45 PM on 17 February 1864, on a clear moonlit night and calm seas, during an ebb-tide, the officer of the deck, Acting Master John Crosby, USN, on the outside blockading vessel, *Housatonic*, descried an object in the water about 100 yards distant. The object came directly at the ship, whereupon the order to slip anchor, engine backed, and all hands to quarters were given. Small arms fire from the warship greeted the object as it closed in on its target. The torpedo struck the starboard side of the warship just forward of the mizzenmast and at the magazine. The explosion caused the vessel to sink stern first and heel to port. The officers and crew saved themselves by clambering up the rigging to await rescue from near-by blockaders. Five of the ship's complement lost their lives (*ORN*, ser. 1, vol. 15:327-338). Initially the destruction to *Housatonic* was attributed to the *David* by the Union navy. The first word in Charleston that *Housatonic* was sunk by the *Hunley* was learned when a Union picket boat was captured by a Confederate picket boat. Union sailors reported that the vessel was the *Housatonic*, which had been reported lost by a gale, was actually blown up by the torpedo boat. They reported the whole stern of the vessel was blown off. And the prisoners stated that all the wooden vessels got out farther to sea as a

consequence. *H. L. Hunley* was never heard from again and was presumed sunken (*ORN*, ser. 1, vol. 15:336-337; *The Charleston Mercury* 29 February 1864). Immediately following the sinking of *Housatonic*, Dahlgren ordered the recovery of all public property from the wreck. From early 1864 to early 1865 salvage operations commenced to recover the guns, paymaster's safe, other valuable materials from the sunken blockader. A search for the "torpedo boat" found no evidence of the Confederate submarine (Conlin 2005:38-40).

Confederate Evacuation of Charleston Harbor Defenses

By early 1865, the Confederate military authorities were asking themselves the question, "How much longer can Charleston be held?" While the defenses of the city were still sound, the anticipated arrival of Sherman from Savannah perplexed the authorities and Beauregard had received word from Richmond that "The defense should not be too protracted, to the sacrifice of the garrison" (Johnson 1890:244-245). Beauregard, once again in charge of Charleston's defenses, asked the army department in Richmond for guidance on abandoning the defenses of the city in late December. The high command ordered a silent withdrawal of the city and the spiking of guns and other measures to prevent their use by Union forces (*ORA*, ser. 1, vol. 44:993-994). In the middle of January 1865, Lieutenant General William Hardee, CSA, ordered the placement of a number of floating torpedoes about the harbor in anticipation of a Union naval attack. Sixteen were placed in the vicinity of the rope obstructions between Forts Sumter and Moultrie and seven at the entrance to Hog Island Channel. One of these torpedoes off Fort Sumter subsequently sank the Union ironclad *Patapsco* during torpedo clearing operations (*Report of Secretary of the Navy of 1865*, 258-259; 290-291).

In November 1864, the Navy Department had advised Dahlgren that Sherman was marching from Atlanta to the seaboard, and aiming in the vicinity of Savannah about the middle of December. Dahlgren was ordered to cooperate with Sherman when communications were established and also to cooperate with Foster to assist in joint operations. The army and navy participated in several combined feints to distract the Confederates from Sherman's true intent. In middle December, the navy was investing the city of Savannah (*Report of Secretary of the Navy of 1865*:6-7). The capture of Savannah and the movement of Sherman through the Carolinas commenced in early January 1865. In early February, Sherman wrote to Dahlgren, "Watch Charleston close. I think Jeff Davis will order it to be abandoned, lest he lose its garrison as well as guns" (*Report of Secretary of the Navy of 1865*:234). The army and navy again conducted various feints up several rivers on 11 February 1865. On 15 February, Union forces saw no change to the Confederate defenses. On 17 February, the navy cooperated with a demonstration on the Stono River with Brigadier General Alexander Schimmelfennig. On the night of 17 February, Dahlgren ordered firing from the Cummings Point navy battery on the Sullivan's Island batteries. The advance monitors were also to fire at Fort Moultrie. The Confederates replied with a few guns and as night wore on ceased firing completely (*Report of Secretary of the Navy of 1865*:6-7).

On the evening of 17 February a Northern correspondent on one of the blockaders reported seeing a "lurid and vivid flash, for an instant illuminating the whole western

horizon, disclosing in the darkness innumerable fragments flying in all directions, followed by a dense column of smoke and flame, and soon the report of a terrible explosion" (*New York Herald* 18 February 1865). The explosions heralded the Confederate abandonment of Charleston. The advance picket monitor *Canonicus* was stationed off Cummings Point throughout the night shelling the Confederates works on the western end of Sullivan's Island. During the early morning hours, the navy observed large fires breaking out in Charleston and heard heavy explosions in the direction of the town, as well as on James Island. At daylight the monitor steamed towards Moultrie, and about 8 AM a magazine blew up in Battery Bee. The navy commander did not deem it prudent to land troops on the island with the "fate of the *Patapsco* before our eyes." About 9 o'clock in the morning, the navy took possession of the blockade runner *Sylph*, or *Celt*, which had run ashore and abreast Fort Moultrie on the night of 14 February, coming out of the harbor with cotton, and the harbor was gradually occupied by Union naval and land forces throughout the day (*Report of Secretary of the Navy of 1865*:249-250).

Union Occupation of Charleston Harbor

Dahlgren informed Welles that Charleston had been abandoned earlier that morning on 18 February 1865 (*Report of Secretary of the Navy of 1865*:234). Investigation of the harbor found many of the Confederate vessels, torpedoes, and other implements used to defend the harbor. The Union navy found the ironclad *Columbia* which had been docked for minor repairs, but departing the dry dock had grounded and remained stuck. Repairs were made to float the vessel, and following its raising on 26 April was towed to Norfolk. In addition to the ironclad several other vessels found included *Transport*, a new light draft vessel, *Lady Davis*, an iron-hulled vessel, but with no engine, and deemed suitable for use as a storeship, *Mab*, a small side-wheel steamer, and three torpedo-boats (*Davids*), one in steaming condition. Eventually, *Lady Davis*, ended its career as the *Weehawken* Lightship, employed in that duty shortly after the abandonment of Charleston to 1871, when it was condemned and sold for scrap (*DANFS*; *Report of Secretary of the Navy of 1865*:250-251; *The Charleston Daily News* 24 August 1871).

Following the captures of Charleston, Fort Fisher, Wilmington, Mobile, and Galveston a reduction of Union naval forces in the Atlantic and Gulf was justified. On 24 February fleet commanders were ordered to send unneeded vessels north, and again on 1 May, another reduction in forces, and again in early July, with 30 vessels remaining in the Atlantic and Gulf. In June, the North and South Atlantic Squadron were combined into the Atlantic Squadron under command of Acting Rear Admiral William Radford, and then succeeded by Rear Admiral David Porter. The fleet in January 1865 consisted of 471 vessels with 4,055 guns, and by mid-year reduced to 29 vessels with 210 guns, exclusive of howitzers (*Report of Secretary of the Navy of 1865*:9-10). On 14 April 1865, a ceremony to raise the American flag once again over Fort Sumter was held in the battered ruins. These celebrations would be muted a day later with the news of the assassination of Lincoln the evening of the flag raising ceremony. Dahlgren at the close of hostilities provided a eulogy to the officers and crew of the Union navy that blockaded the port of Charleston:

The gallant men who lie beneath the blue water, enshrined in the iron sepulchers of the *Weehawken* and *Patapsco*, and still further to seaward in the *Housatonic*, were the witnesses of what you suffered and achieved in the common cause; while the desolate wrecks that strew the shores and choke the channels of Sullivan's island make manifest that your labors were not in vain (*Report of Secretary of the Navy of 1865*:345).

Summation

The Confederate harbor defenses withstood several active Union naval and land assaults. Earthen Confederate forts and the battered masonry of Fort Sumter withstood the much heralded ironclad warships of the Union navy. On the Union side, the navy attempted to maintain its dual role to implement the blockade and to undertake offensive actions at the harbor. Confederate steadfastness to hold the harbor, until flanked by Sherman, proved more resolute than the Union desire to storm the harbor. The naval actions at the harbor resulted in numerous casualties remaining on the battlefield including Union ironclads, Confederate blockade runners, and the first engagement of a submarine with a warship, that provide testimony to the intensity of fighting that occurred at Charleston. The following chapter discusses the methods and results of the archeological research and augments the historical narrative with the individual histories of these battlefield features.

Chapter 3 Archeological Methods and Results

Introduction

The following chapter reflects the investigations undertaken by the MRD to document the archeological resources associated with the Charleston Harbor Naval Battlefield. The previous historical section described the strategy, weapons, and actions at Charleston Harbor, and "...archeology serves up the physical record of those behaviors" (Fox 1993:94). The combination of the historical and archeological records affords a more thorough understanding of the events that occurred here from 1861 to 1865. Between 2009 and 2011, the MRD used a variety of methods, including marine and terrestrial remote sensing equipment, and visual inspections by underwater archeologists and volunteers to locate and record the underwater and land sites. These sites ranged from Federal warships and Confederate blockade runners and support vessels to inundated fortifications and obstructions. The main objectives of the fieldwork were to locate these sites precisely with DGPS and gather baseline magnetic, acoustic, bathymetric, and environmental data pertaining to these resources. Additionally, efforts were directed towards searching for unknown or imprecisely located resources. Besides discussing the archeological documentation of these sites, additional historical information of each site examined augments the previous historical section and serves to highlight the specific role each served during the siege of the harbor.

SCIAA Remote Sensing Equipment

The electronic ensemble to search for shipwrecks, submerged batteries and fortifications and other battlefield resources consisted of the ADAP-III marine archeological prospecting system developed by Sandia Research Associates, Inc. This electronic marine remote sensing system incorporates a Geometrics G-880 cesium magnetometer, a Marine Sonic 600 kHz side-scan sonar, a Cetrek Combi digital fathometer, and a Trimble AgGPS132 Differential Global Positioning System (DGPS). Three onboard networked and ruggedized-computers, utilizing Windows 98 and 2000 operating systems, managed the digital acquisition of position, depth, sonar, and magnetometer data. A Dell Latitude laptop also was used to implement survey operations and to acquire data. Two auxiliary screens present real-time guidance to the helmsman to ensure accurate survey transects or to navigate towards a specified target. A 24Kw Honda generator provided onboard power to the equipment. The system was operated aboard SCIAA's primary research vessel, a 25-foot C-Hawk. During the course of the remote-sensing phase of the project, a SyQwest Stratabox dual-frequency (3.5/10 kHz) sub-bottom profiler was added to the survey package, and a Humminbird 997c SI Combo side-scan sonar unit provided added sonar capabilities to the electronic array.

The Geometrics G-880 cesium magnetometer consists of a towed-array sensor equipped with a flotation device, deflector, and 91.4 m (300 ft) of cable. Survey protocols

for the magnetometer specified towing the sensor not less than 18.28 m (60 ft) behind the DGPS antenna to prevent magnetic interference from the boat. The flotation device was always deployed with the sensor due to the shallow waters of the survey areas and the potential for snagging exposed shipwreck components or for catching the bottom. Magnetometer data was recorded either at a 1 or 0.5 second sample rate at a sensitivity of 0.01nT using MagLog Lite software from Geometrics. Output data from the MagLog Lite software included magnetometer readings along with the recorded ship coordinates, sensor layback coordinates and other information. The MagLog Lite software also guided remote-sensing operations using maps to delineate the survey area, monitoring boat speed and depth readings.

The magnetometer is the primary archeological prospecting tool used by marine archeologists to search for shipwreck sites. The magnetometer measures the earth's ambient magnetic field through scalar measurements. This measurement is expressed as the Total Field intensity in nano-Teslas or gammas (nT or γ) that is variable from 20,000 to 100,000 nT on the earth's surface. In South Carolina the ambient Total Field intensity ranges from 40,000 to 50,000 nT. Local disturbances caused by geological features or man-made objects add to or subtract from the ambient magnetic field and are called magnetic anomalies. Man-made objects that affect the marine magnetic field include ferro-magnetic materials, such as iron or steel, and rock ballast concentrations high in magnetite.

The G-880 cesium magnetometer uses cesium vapor (non-radioactive Cs133) and a light source to agitate the cesium atoms to a high level. The high state of agitation is then reduced by a RF (radio frequency) de-pumping coil. The rate of the energy transition or "pumping de-pumping" from a higher to lower level is determined by the strength of the ambient magnetic field. This process is known as Zeeman splitting. This transition is then digitally quantified to measure the local magnetic field around the sensor. Several factors can degrade the reading that includes sea swells, magnetic effects of the vessel, lack of control or knowledge of the sensor's position, and other survey errors that limit the magnetometer's performance. Despite these limitations, the cesium magnetometer has a very high sensitivity and rapid sample rate that yields precise measurement of the local magnetic field, which is especially applicable to marine archeological prospecting.

Many factors also determine the detection and strength of a magnetic anomaly including mass of the source, sensor to source distance, and orientation of the sensor to the source to name a few. Interpretation of magnetic anomalies is not an exact science. The amplitude or strength; signature, i.e., whether a dipole, monopole, or multi-component; and duration, aid in determining whether an anomaly is the result of a single-source or a cluster of magnetic objects. These considerations among others are taken into account to determine whether a magnetic anomaly portends an archeologically or historically significant cultural object that warrants further investigation.

The Marine Sonics Technology, Ltd. side-scan sonar system consisted of a dual-channel 600 kHz towfish, 91.4 m (300 ft) of cable and Sea Scan PC proprietary software to operate the sonar. The sonar sensor was suspended off the port side of the research vessel approximately 0.9 m (3 ft), where it could be easily lowered or raised as appropriate to avoid

hitting the bottom or snagging exposed wreckage. Range of the sensor's acoustic signal was typically set to 20 meters (65 ft). The side-scan sonar, basically works by sending out acoustic sound waves towards the bottom and then records the strength of the echo returns from the sea floor. In this case, the 600 kHz frequency range was employed, as it is ideal for generating details of exposed features on the bottom. The towfish emits continuous narrow beam sound pulses perpendicular to the survey swath. These pulses pass through the water and are then reflected back from the bottom or from an object. The signal strength is recorded and drawn line by line to create a sonar record of the bottom. The operator manipulates the towfish signal via software on a dedicated onboard computer. The MST sonar files generated during the course of the survey are reviewed using Sea Scan PC Review proprietary software.

Another side-scan sonar device, a Humminbird 997c SI Combo, was also deployed during the course of the survey. Consisting of a small monitor mounted to the helm and the transducer affixed to the bottom of the transom, this device while designed primarily for fishermen, proved extremely useful and adaptable to our archeological project. Primarily due to allowing for quick imaging of the bottom prior to ground-truthing by archeologists and volunteers, as well as demonstrating a capability to clearly image the bottom while going 6-7 knots during the course of a magnetometer survey. The unit can record data during a survey (SON files) and take snapshot PNG images of specific targets. Third-party software, HumViewer, created by Martin Johansen, allowed for review of the SON files on a computer, rather than on the unit itself.

Data from both the Cetrek Combi fathometer and Trimble AgGPS132 DGPS unit were logged using GPSlog software from Sandia Research Associates, Inc. Depth data were collected four times a second and tagged with DGPS coordinates to furnish bathymetric information of a survey area. No correction programs were utilized to account for the daily tidal fluctuation or heave from waves. The time stamped data, however, allows for subsequent manual correction to determine an approximate depth using published predicted tidal variation for a particular anomaly. Differential correction was obtained by the Coast Guard Maritime Differential GPS (DGPS) Service that broadcasts correction signals on marine radiobeacon frequencies to improve the accuracy and integrity of GPS signals. This service provides minimum 10-meter accuracy, with typical positional error of DGPS around 1-3 m (3.2-9.8 ft) (<http://www.navcen.uscg.gov/dgps/default.htm>, 25 August 2009). The software generated a LOG file containing coordinates, depth, speed over ground, course over ground, etc. The DGPS unit, connected to a light bar that displayed course and survey parameters, provided guidance to the helmsman to ensure accurate coverage of a survey area. All survey DGPS positions correspond to the World Geodetic System 1984 (WGS84) datum (which corresponds to North American Datum 1983 [NAD83]) and were logged in Universal Transverse Mercator (UTM) Zone 17 coordinates.

A SyQwest Stratabox dual-frequency (3.5/10 kHz) sub-bottom profiler was added to the survey package at the start of the fieldwork component of the project. This marine instrument uses two acoustic frequencies, 3.5 and 10 kHz, to penetrate below the sediments and is specifically designed for shallow-water operation. Mounted over the gunwale of the research vessel, the two separate sensors increased the versatility of the device to penetrate

bottom depths ranging up to 40 meters with the 10 kHz frequency and up to 100 m (131 ft) with the 3.5 kHz frequency. The basic operating principle of the sub-bottom profiler is similar to the side-scan sonar, except using a narrow, vertical acoustic wave to image below the sediments. The sub-bottom profiler builds a series of vertical slices of the bottom sediments, with the degree of reflectivity of the soils influencing the return of the acoustic signal. Harder sediments, such as large-grained sands, impede the acoustic signal, hence limiting the penetration of the signal. Softer sediments, that is, muds or silts, offer little resistance to the sound wave and allow for greater penetration below the sediments. From an archeological perspective, the sub-bottom profiler is used to determine the depth and extent of a potential archeological feature, for example, a buried shipwreck, either associated with an anomaly detected by the magnetometer or side-scan sonar. Additionally, the sub-bottom profiler, also could be used as a stand-alone device, but in our remote sensing scheme, the device was used after the primary survey instruments determined that an object of note was present, and not visible in a sonogram. The data was recorded in both SEG and ODC files.

Geographical Information System (GIS) Processing

Following data collection, the magnetometer files were post-processed in Microsoft's Excel spreadsheet program to format the data. Two columns of magnetic data were created: one, the Total Field of the magnetic data recorded by the magnetometer and logged by the MagLog Lite software during the course of the survey, and two, a column of Gradient magnetic data, basically the Total Field magnetic data stripped into a simple plus or minus gradient reading by the following process. In this case, a 2-point gradient half-width was chosen to generate the gradient data. This process entailed subtracting each Total Field reading from the one before it to record the difference of each reading, which results in the removal of the ambient earth's magnetic field to obtain the residual values of potential anomalies of interest. For example, just referencing the magnetic information, a typical magnetometer data stream would appear like this: 49983.9960, 49983.9960, 49983.9840, 49983.950. Applying the Gradient Analysis software would transform the magnetic data into: 0.0, 0.0, -0.018, +0.034. This edited magnetometer data was then entered into Microsoft Excel to create a DBaseIV database containing positional coordinates and magnetometer readings. Depth data from the LOG files were post-processed through Microsoft Excel to create a DbaseIV database comprising positional coordinates and depth reading in meters. Once the magnetometer and depth data was edited and converted to a DBaseIV database, the information was added to Earth Systems Research Institute, Inc.'s ArcGIS 9.3 software, a Geographic Information System (GIS) program. The magnetometer and depth data then underwent additional editing to remove magnetic spikes, faulty depth readings, and turns to ensure accurate information to begin the analysis process.

GIS is a computer system capable of using multiple, spatially referenced databases to produce maps that graphically depict that data. It provides a user with the ability to collect, store, edit, manipulate and depict the large amounts of data generated by marine remote sensing surveys. The results are presented graphically, allowing patterns to be recognized easily by rapid manipulation of scale and overlying themes or layers. GIS becomes an especially useful tool for battlefield management where one must analyze not only the spatial relationships of archeological, cultural, and natural features in a broad area, but also examine

the relationship of diverse information within each site or survey block. The ArcGIS application was used to visually express the spatial relationships of the collected digital survey information by which to analyze, manipulate, and assimilate the magnetometer, bathymetric, and sonar data.

One ArcGIS extension, Spatial Analyst, increased functionality to the core program by providing the means to contour the magnetic and bathymetric data. All contours were generated in Spatial Analyst using the Inverse Distance Weighted (IDW) method. The IDW technique gives more influence to closer data points than points further away to create the contour map. This extension created the ability to overlay the magnetic contours on georectified sonograms and to determine any spatial correlations between magnetic and acoustic anomalies.

Another software application, Chesapeake Technology, Inc.'s SonarWiz.Map, created georectified sonograms of all the acoustic data generated from the side-scan sonar units and the sub-bottom profiler data. However, prior to import into SonarWiz.Map, a utility software by Humminbird, SON2XTF, converted the proprietary SON files to the XTF standard (eXtended Triton Format). Once imported into SonarWiz.MAP, the XTF, MST, SEG, and ODC files were post-processed to remove turns and to improve the clarity of the image. Additionally, shapefiles of sub-bottom profiler detected reflectors were generated. All of the acoustic data were converted into GeoTIFF files and then imported into ESRI's ArcGIS 9 geographical information system software to create mosaics of the bottom.

To build the GIS database of a particular archeological site, for example at the *Patapsco* site, or a survey area, a Data Frame consisting of several layers was constructed. A Data Frame in ArcGIS is essentially the drawing board on which various layers are added to construct a map. Layers in the project's database consisted of raw and processed magnetometer and depth data. Contour themes, depicting magnetometer intensity and bathymetric depth, were derived from the magnetometer and depth data. Variations of the magnetic contours by differing gamma scales enhanced data interpretation. Geo-referenced sonograms aided in determining correlated magnetic and acoustic anomalies. Additionally, historic charts were geo-referenced to place them to modern coordinate systems. Underlying nautical charts from NOAA and 7.5 USGS topographical charts, along with South Carolina Department of Natural Resource Digital Ortho-Quarter Quads (DOQQs), spatially referenced the survey data to the present marine landscape. Layers were also created from polygons, lines, and points derived from the survey data and historical images to construct shape files depicting survey coverages, and modern and historic landscapes features. Each theme or layer of data can be turned on or off depending on the desired outcome of analysis. The main utility of ArcGIS is to construct maps, or Layouts, based on the above themes to visually and spatially depict the survey data for analysis and illustrative purposes.

Post-Processing and Curation of Data

Post processing of all survey data was accomplished both in the field and in the office. In the field, archeologists curated the raw electronic data by transferring files from the onboard computers to a Dell Latitude portable computer. The laptop computer contained

the ArcGIS software and other programs necessary to allow the archeologist to analyze the survey data from that day and use that information to plan the next survey. Once a survey was completed, the electronic data from the laptop were downloaded to a Dell Optiplex desktop computer where the data from each survey could be integrated into the GIS project. Once a survey was post-processed the resultant data was archived to CD through ArcGIS. Each of the data layers created in ArcGIS has Federal Geographic Data Committee compliant metadata.

Marine Remote Sensing Operations

Project Area

The battlefield boundary was established by the outer limit of the Union blockade of Charleston Harbor, determined through historical references, which extended northwards to Dewees Inlet, southwards to Stono Inlet, eastwards beyond the ebb-delta sandbar to the 18-foot contour (3 fathom line), and westwards to the city's seawall and shoreline. Within this larger area, the battlefield was sub-divided by the Inner Harbor, Outer Harbor, and Union Blockade. The Inner Harbor defenses encompassed the city seawall and out to Fort Johnson and across to Mt. Pleasant. Known and potential archeological components related to these defenses include Fort Ripley, several sites of the frame torpedoes and row obstructions, and the remains of the Confederate transport vessel *Etiwan*. The Outer Harbor defenses encompass the area from Fort Sumter to Fort Moultrie and then along the coastline of Sullivan's and Morris islands. Known and potential archeological sites related in this area of the battlefield include the Federal ironclads *Patapsco*, *Weehawken*, and *Keokuk*; Confederate steamer *Manigault*, several blockade runners at Bowman's Jetty, the 7 April 1863 naval ironclad assault battleground, and the submerged remains of Battery Wagner and other features associated with the Federal campaign to take Morris Island. The Union blockade area of the battlefield extended from the south at the Stono River entrance to the north at Dewees Inlet, and outwards along the 3 fathom (18 ft; 5.5 m) contour. Known and potential archeological sites related to this area of the battlefield include the wrecks of several blockade runners, the First and Second Stone Fleets, and the *Housatonic-Hunley* engagement site.

Survey Methodology

Preparation for the various survey areas, diving operations, and site recordings occurred at SCIAA in Columbia. Areas in which to place survey blocks were determined using results from previous surveys, historical chart locations, and information from the state site files. This information was then correlated with nautical charts and state quadrangle maps, as well as tide and current information. Based on these data, which were displayed in a GIS format, computer software was used to generate survey blocks that encompassed the known or suspected locations of each shipwreck, submerged battery, and other sites slated for investigation. A series of waypoints was entered into the onboard navigation computer that enabled navigation to various survey locations. Once in the field, survey lanes were

generated using the onboard navigation computer, with beginning and ending X-Y coordinates to cover the approximate survey block area.

Two nautical charts of primary importance assisted MRD in preparing survey areas for these battlefield components. The first map was prepared by the US Coast Survey under direction of Rear Admiral Dahlgren in 1865 following the abandonment of Charleston by the Confederates entitled *General Map of Charleston Harbor, South Carolina Showing Rebel Defences [sic] and Obstructions* (See Figure 2). The chart reveals the placement of obstructions and torpedoes, the location of sunken vessels, and the positions of various Confederate batteries on a nautical chart. Essentially, this map shows the culmination of the Confederate defenses until they were abandoned in early 1865, along with the combat casualties on the battlefield. The 1865 chart is basically an updated version of an earlier nautical chart of Charleston Harbor created by the US Coast Survey in 1858 titled *Preliminary Chart of Charleston Harbor and its Approaches*. While predating the Civil War, this chart provided useful and detailed bathymetry data, along with the location of the various harbor channels and sandbars. In addition to serving as historical references for the natural and cultural pre- and post-war environments of the harbor, they aided in developing our archeological survey strategy.

Each of the nautical charts was geo-referenced in ArcGis ArcMap 9.3 using known positions, i.e., street intersections in Charleston, Forts Sumter and Moultrie, to refine the location of these battlefield components. Acknowledging an imprecision of upwards to several hundred meters moving further away from these precise control points, these errors were accounted for by enlarging the boundaries of a survey area. Despite inaccuracies, the charts proved invaluable in quickly setting up survey areas for the work to commence in documenting the archeological components of the battlefield. The survey methodology also relied heavily on previous work conducted throughout the years by various individuals and organizations in the battlefield area which is discussed in the next section.

Varying survey objectives and primary instruments determined lane spacing ranging from 5 to 50 meters. Typically, dense lane spacing of around 5 meters was used while deploying the sub-bottom profiler, while the 50-meter distance was employed when exact locations of a site were not known. In this case, anomalies detected during this phase of the survey were re-visited to conduct refining operations to gather better electronic data of a specified area. Magnetometer sampling rates ranged from 0.1-1.0 seconds, with 0.5 the norm. Lane spacing of 20 meters was the norm to collect good magnetic data and provide sufficient overlap of acoustic imagery to adequately cover the survey area. With the side-scan sonar set on two-channel operation using the 20-meter scale, this provided a greater than 100% overlap. Occasionally, a single-channel setting was used to gain better detail of a shipwreck. In general, magnetometer and side-scan operations were run separately, until later in the project when the Humminbird 997c SI Combo unit was deployed. A six to seven-knot speed was maintained with only the magnetometer sensor deployed, or at 4-5 knots if used in conjunction with the Marine Sonic sonar. The majority of the targets were known to lie in shallow depths ranging from one to ten meters (3.2-32.8 ft) (mlw). Hence, MRD towed the magnetometer sensor on the surface. Similarly, the sonar sensor was suspended from a spar off the port side, while the sub-bottom profiler sensors were rigged off the starboard side

of the C-Hawk and adjusted below the surface of the water as circumstances dictated. In addition to marine remote sensing operations, MRD staff also conducted preliminary documentation at several archeological sites and ground-truthed, or visually inspected prioritized magnetic and acoustic anomalies using basic underwater and terrestrial recording methods.

Two types of visual inspection by underwater archeologists and volunteers occurred during the project. The first type focused on visually inspecting prioritized magnetic and acoustic anomalies to determine their source. Typically, an underwater archeologist equipped with a metal detector, assisted by a volunteer, conducted a circle search to a maximum radius of 15.2 m (50 ft). As the overall project was non-disturbance in nature, i.e., undertaking no excavations, only those magnetic anomalies found exposed on the bottom or just below the surface, located by the metal detector and uncovered by hand-fanning, were identified. This limited positive identification of the many anomalies buried beyond the range of the metal detector. However, the information derived from the remote sensing data and the visual inspections will prove useful when planning future investigations of the magnetic anomalies on the battlefield. The second kind of visual inspection focused on investigating shipwrecks associated with the battlefield, namely blockade runners and a Federal ironclad. These dives were reconnaissance in nature with the main priority to collect underwater video, as well as basic identification of remaining structural components.

During the research phase of the project, several important terrestrial components associated with the battlefield were identified for documentation. These resources included remnants of the Swamp Angel Battery, the remains of the *Weehawken* Torpedo Raft, and several blockade runners once lying underwater but through sediment accretion are now buried underground. Visual inspection of the Swamp Angel and torpedo raft were preliminary in scope to gather positional data and basic construction methods using standard archeological recording methods. Documenting the buried blockade runners utilized two geophysical tools: a Bartington® Grad601 magnetic gradiometer system and a MALÅ X3M ground penetrating radar. Both of these instruments were operated by Dr. Jonathan Leader, state archeologist, who was assisted by volunteers. The gradiometer consists of two vertical fluxgate magnetometers with a resolution of between 0.01-0.03nT set one meter apart. The ensemble is harnessed to one person to complete a pedestrian survey or search of an area. The device measures the magnetic gradient between the two magnetometers and logs to an onboard data logger. The MALÅ X3M ground penetrating radar consists of an integrated control unit and a shielded antenna (500 MHz frequency) configured to a four-wheeled push cart. The 500 MHz shielded antenna is suitable for medium to shallow penetration. The data is logged to an onboard data logger. Both the gradiometer and ground penetrating radar data are downloaded to a personal computer.

Post War Salvage Activities

Immediately following the evacuation of Charleston Harbor, Union naval and land forces inspected the terrestrial and underwater components of the Confederate defenses and other battlefield works. They also interviewed a number of informants who had been directly involved in creating and deploying these defensive structures (*ORN*, ser. 1, vol. 16:380-389).

The efforts of this intelligence gathering manifested in the 1865 *General Map of Charleston Harbor, South Carolina Showing Rebel Defences [sic] and Obstructions*, proved crucial in implementing the fieldwork portion of the ABPP project. The Union navy then began removing the various underwater obstructions and torpedoes in the harbor. In addition to removing these defensive artifices, the Union navy inspected a number of blockade runners to determine the worth of their remaining cargos. The survey deemed the cargos of the vessels worthless, as well as a waste of time and effort to recover, primarily a result of their longevity in the water or in surf zones (*ORN*, ser. 1, vol. 16:354). On 26 July 1865, the Union navy entered into a year-long contract with a Mr. M. Gray, a former Confederate Captain of Engineers involved with deploying torpedoes and obstructions in the harbor, to salvage property belonging to the Confederate government with a split of the proceeds to the Federal government. Mr. Gray agreed to recover iron, machinery, and other components from the three Confederate ironclads—*Chicora*, *Palmetto State*, and *Charleston*—a number of blockade runners, and various obstructions, including the boom obstruction at Hog Island Channel, in and around the harbor (*ORN*, ser. 1, vol. 16:352-356).

Several years after the war and until 1870, two companies attempted unsuccessfully to raise the ironclads *Keokuk* and *Weehawken*. The futility of the operations to raise the sunken ironclads caused the Federal government to let out a contract instead to the New York City firm Monitor Wrecking Company to blast the wrecks, including *Patapsco*, to salvage their various metal components (*The Charleston Daily News* 8 January 1870). In addition to the three monitors, the contract awarded salvage on the wrecks of the blockade runners and the *Housatonic* (*The Charleston Daily News* 8 January 1870). Throughout the 1870s, a number of other salvage projects on Federal warships and blockade runners were authorized by the US Army Corps of Engineers. The main objective of these salvage efforts was to improve harbor navigation. The 1870s salvage projects occurred on the three sunken Federal ironclads—*Weehawken*, *Keokuk*, and *Patapsco*—and the wooden blockader *Housatonic*. Another focus of salvage during this period was devoted to the numerous blockade runners sunk off Fort Moultrie and Bowman's Jetty. Primarily, these projects recovered the large iron components off the shipwrecks, i.e., boilers, machinery, turrets, armor belts, and more valuable metals including copper and lead (SCHS-Maillefert; *The Charleston Daily News* 4 August 1873). One of the contractors, Benjamin Maillefert had a collection of surgical instruments, ship utensils, a breech-loading rifle, and a lamp with the candles in place and other articles recovered from the monitors and blockade runner wrecks at Charleston. He was also under orders by the Federal government to collect human bones and when gathering a sufficient quantity was to have them buried within the walls of Fort Moultrie (*The Charleston Daily News* 10 August 1872; 28 January 1873). Another round of salvage activities occurred in the early 1900s. The wreck of *Housatonic* underwent additional salvage in 1909. In the late 1920s, salvage operations commenced on the Confederate ironclads sunk in the Cooper River, including the recovery of the cannons, various cannon projectiles, personal effects, and components (SCHC-Rivers). Specific information relating to the salvage of each particular shipwreck is discussed in the following sections.

Previous Archeological Work

The shipwrecks associated with the battlefield for the most part have lain undisturbed since the various navigation and harbor improvements by the Corps of Engineers of the 1870s, 1900s, and 1920s. In the late 1960s, with the advent of SCUBA, individuals began turning their attention to the shipwrecks associated with the naval battlefield. Instead of profiting from salvaging the metal components of the shipwrecks, new salvagers instead wanted to retrieve artifacts from the wrecks, for example, ceramics, personal items, cannons, and anchors from these sites, for personal collections and to fuel a growing Civil War antiques market. Until the late 1960s, there was no state legislation directed specifically at protecting the archeological integrity of shipwrecks in state waters. This changed with the discovery of the blockade runners *Georgiana* and *Mary Bowers* wreck site and the subsequent request to salvage the wreck in 1968.

The first systematic salvage operation geared to recovering artifacts from a wreck site occurred in 1968 and was instigated by E. Lee Spence, a salvor from Charleston. This initiated the passing of state legislation in that same year, which was devoted primarily to regulating shipwreck salvage activities through issuance of licenses. The law gave administration of the act to the SC Department of Archives and History (SCDAH) with SCIAA acting in an advisory capacity. In 1969, the legislation was amended at the request of SCDAH to make SCIAA the administrator of the law. The law was sparked by the discovery of the aforementioned blockade runners by Shipwrecks, Inc., a company directed by Mr. Spence. The organization was the recipient of the first salvage license issued under the new legislation. Assuming control of the salvage process, SCIAA's director and staff immediately began working on regulations and guidelines for the oversight of the license (Stephenson 1975:56). Shortly afterwards, in the early 1970s, a license was obtained by Mr. Spence and a consortium of companies to salvage the blockade runner *Constance* (License #5 on file, UAD/SCIAA). Mr. Spence was active throughout the late 1960s and 1970s exploring a number of Civil War-era shipwrecks in Charleston Harbor (Spence 1984).

In 1980, the National Underwater Marine Agency (NUMA), created by novelist Clive Cussler, in cooperation with SCIAA, began a project to search for the remains of the submarine *H.L. Hunley* off Sullivan's Island and Isle of Palms and other Civil War shipwrecks in Charleston Harbor. They intended to conduct remote sensing surveys using a proton magnetometer and a sub-bottom profiler to locate the submarine and its victim, USS *Housatonic*. During the first year of the project, they successfully relocated the remains of *Housatonic* and several magnetic anomalies bearing the potential to be the *Hunley*. They also relocated the remains of the ironclads *Weehawken* and *Keokuk* off Morris Island, and *Patapsco* off Fort Sumter (Cussler 1981:27-32). In 1981, NUMA, again working under a license from SCIAA, returned to continue the *Hunley* survey, to ground-truth previously recorded anomalies, and secondarily to locate other Civil War-period shipwrecks. The search to locate the submarine proved unsuccessful but did succeed in obtaining additional information about *Keokuk* and *Weehawken*. Magnetic anomalies at the supposed locations of several Confederate ironclads in the Cooper River were identified as modern iron or steel debris. The venture also pinpointed the location of several blockade runners under the beach

and out at sea (Browning and West 1984). The location and information about each of the wrecks was entered into the South Carolina Archeological Site Files.

Shortly after *Patapsco*'s rediscovery by NUMA, Florida salvager Howard Tower and a partner began to dive the wreck and expressed an interest in salvaging artifacts from the wreck. Tower wrote to the Department of Navy's Judge Advocate General's office seeking permission to excavate the wreck in cooperation with SCIAA in early 1985. The office turned down Tower's request to excavate, based on the long-standing policy of not disturbing war graves. In anticipation of commencing excavations, SCIAA and Tower had obtained use of the US Army Corps of Engineers side-scan sonar to gather some acoustic data of the site. Tower and SCIAA divers briefly investigated the site and found exposed structure and some cannon projectiles. Due to the Navy's position and denial of his proposal, Tower dropped his interest in salvaging the vessel (Tower *Patapsco* materials on file at MRD/SCIAA).

Denied the opportunity to excavate *Patapsco*, Tower and several associates directed their attention to the blockade runners wrecked off Bowman's Jetty. Shipwrecks recorded in this area included, *Minho*, *Prince Albert*, and *Stono* (formerly USS *Isaac Smith*). They found a jumble of ship structure, machinery, coal, and artifacts strewn along the bottom north of the jetty. Tower applied for and received salvage license number 32 from SCIAA in 1985 under the premise that these were private vessels engaged in blockade running. Working under the license stipulations, Tower and his group salvaged a number of artifacts, recorded exposed sections of the wrecks, and conducted historical research of the ships. SCIAA and the salvor conducted a division of the artifacts during the lifetime of the salvage license, which concluded in 1990. All artifacts from the three wrecks obtained by SCIAA from the distribution are located at the South Carolina State Curation Facility (License #32 on file at MRD/SCIAA).

The final hunt for *Hunley* by NUMA began again in 1994 and continued into 1995. The project was organized as a joint effort by NUMA and SCIAA. This arrangement alleviated the need for the NUMA group to obtain a license and provided an opportunity to share resources with SCIAA. NUMA conducted the remote sensing operations while SCIAA provided the ground-truthing team. Equipped with DGPS and a proton magnetometer, the NUMA team re-surveyed the areas previously completed in 1980 and 1981. A number of anomalies were detected and ground-truthed before the discovery of the submarine approximately 400 meters further out to sea from *Housatonic* (Wilbanks and Hall 1997).

Following the announcement of the discovery, the State of South Carolina and the Federal government reached an accord for the management responsibilities of the submarine. Provisions in the agreement vested title to the Federal government, but the right for display in perpetuity to the State. A Federal, State, and private partnership including the Department of the Navy's Naval History & Heritage Command (NHHC) Underwater Archeological Branch, National Park Service's Submerged Resources Center (SRC), SCIAA, Friends of the *Hunley*, and the SC State Hunley Commission was formed to study and recover the submarine in 1996 (Murphy et al. 1996). The submarine was recovered in the summer of 2000 and resides at the Warren Lasch Conservation Facility until eventual relocation to a purpose-built museum following conservation. In an effort to learn more about the events of the *H. L.*

Hunley and *Housatonic* naval engagement site, the same organizations joined forces to investigate the remains of the sunken warship in 1999. Funded by Federal, State, and private monies, the investigation succeeded in gathering structural and environmental information about the shipwreck. Artifacts recovered during the excavations will form part of the *Hunley* exhibition (Conlin et al. 2005).

In 2001, Clive Cussler sponsored an expedition directed by Ralph Wilbanks to search for the remains of HMS *Actaeon* lost during the 28 June 1776 attack on Charleston during the American Revolutionary War. The remains of the English warship were not found, but a large magnetic anomaly detected in the survey area proved of interest. Probing revealed the magnetic object was buried about 2.4-3 m (8-10 ft) below the bottom. Excavations at the site determined the presence of an iron object, but due to the depth of overburden, little else was determined. Historically, one shipwreck seems plausible as the candidate of the anomaly, *Sumter*, a Confederate transport steamer. The vessel was accidentally sunk off Cummings Point by Confederate gunners at Fort Moultrie during the night of 31 August 1863, mistaking the ship as a Union warship (Ralph Wilbanks, pers. comm., 2010; *ORN*, ser. 1, vol. 28 (part 1):705-706)).

In 2001 the National Park Service's Submerged Resources Center undertook a compliance survey in the waters around Fort Sumter. Instigated by a project to create a breakwater at the fort, the survey indicated the presence of magnetic and acoustic cultural anomalies. Visual inspection during low tide and acoustic interpretation determined that these cultural objects bore no historical or archeological significance to Fort Sumter, mostly comprised of modern materials (Russell 2003).

In 1998, SCIAA obtained funds through the Department of Defense Legacy Resource Management Program administered by the NHHC to document and to develop a management plan for US Navy shipwrecks in South Carolina waters. The survey encompassed four general areas in the state: Port Royal Sound, ACE Basin, Charleston Harbor, and Winyah Bay. In Charleston Harbor, the primary focus of the survey was on gathering electronic data on the three Federal ironclads *Patapsco*, *Keokuk*, and *Weehawken*. Additionally, several blockade runners were also electronically investigated. The results of the survey in the harbor precisely determined the location of each of these wrecks, as well as gathering baseline magnetic, acoustic, and bathymetric data (Spirek and Amer 2004).

ABPP Archeological Site Investigations

The following section discusses in detail the archeological investigations of the various components of the naval battlefield conducted by the MRD as part of the ABPP fieldwork in 2009-2011. These sites include Federal warships, blockade runners, batteries, and obstructions. The discussion focuses on the marine remote sensing operations and findings, visual inspections of prioritized targets and shipwrecks, and terrestrial investigations at several sites. The section incorporates information derived from previous archeological investigations, primarily the MRD's Naval Wreck Survey and the *H.L. Hunley* and *Housatonic* naval engagement site. The georeferenced 1865 nautical chart provided a launching point for the survey of several battlefield components, especially those in the inner

harbor. A historical synopsis of each archeological component narrates their specific context and contribution to the battlefield. Each of the archeological sites is categorized by its placement on the battlefield: Inner Harbor Defenses, Outer Harbor Defenses, and Blockade.

Inner Harbor Defenses

The Inner Harbor Defenses were defined as those within the confines of the harbor bounded to the east by Fort Sumter and Fort Moultrie and west to the city (See Figures 3 and 4). The archeological resources investigated in this part of the battlefield included Fort Ripley, the sites of several frame torpedoes, and the row obstructions. The remains of Fort Ripley are still visible during low tide and are marked by a navigation warning. The positions of the harbor obstructions were obtained by overlaying the georeferenced 1865 harbor chart over modern nautical charts of the harbor. Each of the sites was electronically investigated by the magnetometer and side-scan sonar, and visual inspections occurred on the remains of Fort Ripley (Figure 10).

Fort Ripley

In early 1862, work commenced on building a fixed battery on the Middle Ground Shoal, located between Castle Pinckney and Fort Johnson. Called Battery or Fort Ripley, named in honor of Confederate Brigadier General Roswell Ripley, as well as the Middle Ground Battery, the fort was designed to support Fort Moultrie in the event of a bombardment of that fort, as well as a strong addition to the defense of the city. The four-sided work rested on timber caissons, ballasted with the rubbish from the 11-12 December 1861 fire in the city, in a water depth of eight feet. General Robert E. Lee suggested casemating the fort with heavy timber and railroad iron to strengthen the work, although the engineers did not consider the work shot proof (*ORA*, ser. 1, vol. 6:387-388; 390-391; Johnson 1890:21). By July the fort reportedly had five guns installed in the defensive structure (*The Charleston Mercury* 10 July 1862). A report in 1864 listed Fort Ripley having one 8-inch Columbiad and one 10-inch Columbiad (*ORA*, ser. 1, vol. 35 (part 2):465).

Brigadier General Beauregard inspected the work, which was nearly complete, in late September 1862. He ordered more rubble thrown around the foundation to the high water mark. Reported as unfinished in October, the fort required an additional six weeks to complete. In mid-February 1863, Beauregard ordered the installation of a 10-inch Columbiad at the battery (*ORA*, ser. 1, vol. 14:610; 617; 627; 786). Positioned about 600-700 yards in front of the battery was a double row of pile obstructions stretching due north from the Middle Ground and across the Castle Pinckney/Folly Island Channel for half a mile (Johnson 1890:29). Despite its interior position, Federal batteries at Cummings Point occasionally tossed a few shells at Fort Ripley (*Charleston Mercury* 12 August, 2 September 1864). After the abandonment of Charleston by Confederate forces, Union army and navy units began raising the United States flags over the various military installation, including Fort Ripley, where the Union officer remarked that the guns were in good order, and that one Quaker gun was mounted bearing southeast (*ORA*, ser. 1, vol. 47 (part 1):1019).

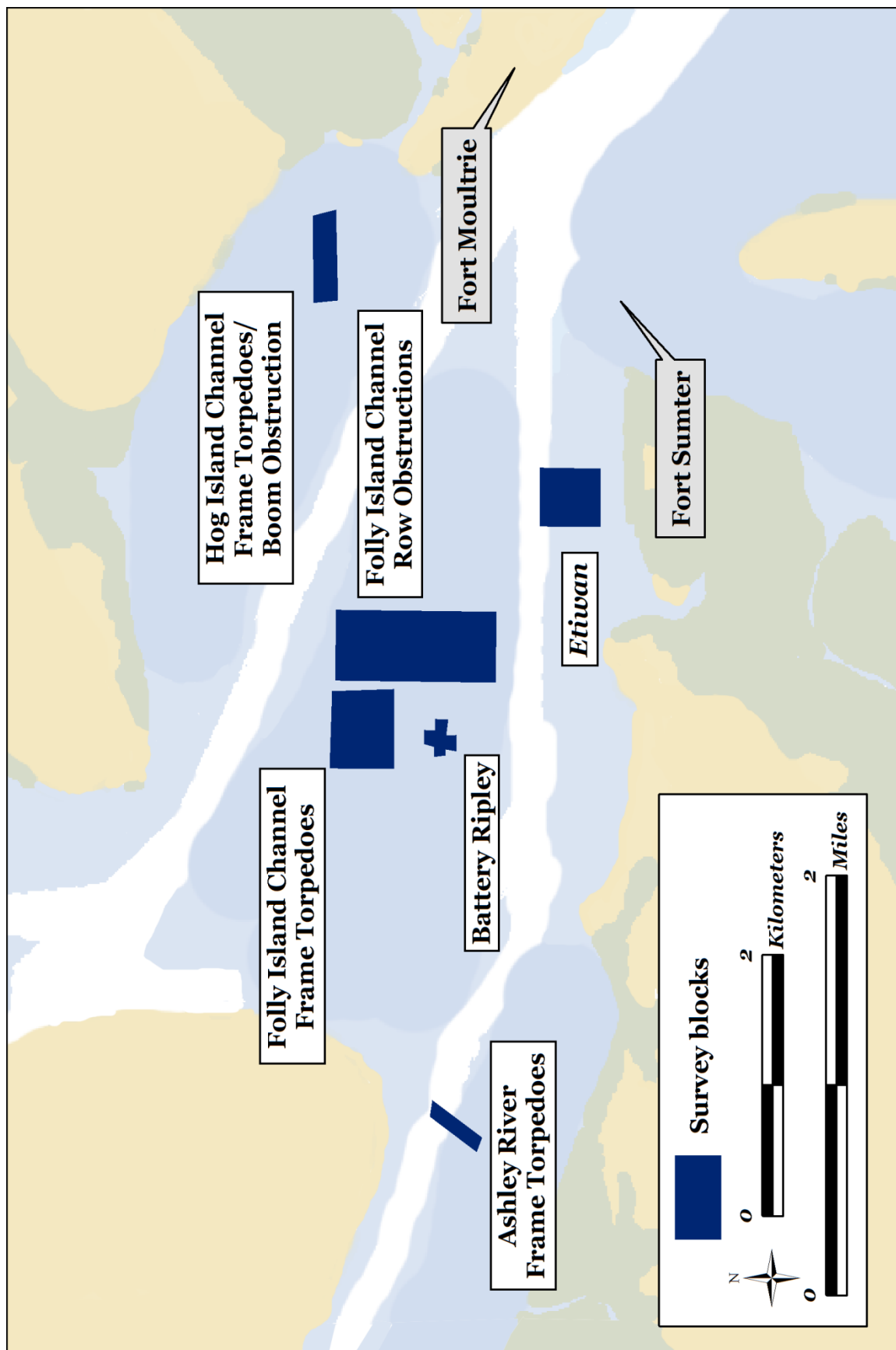


Figure 10: Inner Harbor Defenses survey areas (NOAA chart 11524, scale 1:20,000, 2010; SCIAA graphic).

Two drawings, one from the 31 January 1863 issue of *Harper's Weekly* and an 1865 pencil drawing show the constructed fort. The *Harper's Weekly* image, drawn by a Confederate soldier, shows the sea face side of the four-sided battery sitting atop a foundation slightly above the waterline. The sides are sloped inwards from the base to the top, and atop the roof a guardrail encircled the upper perimeter of the battery. A lone sentry is noted. The two visible walls are punctuated with five cannons on the seaface side, and three on the northern face. Directly behind the fort appears to be a dismantled hulk, most likely serving as crew quarters. After the heavy artillery had been removed from Fort Sumter, the artillery men were distributed around the harbor. A sister of William Grimball, one of these artillery men, noted in her journal that he was stationed at Fort Ripley and "...they have a boat to live in & find it very disagreeable" (SHC-Grimball). The presence of railroad facing as suggested by Lee is not positively evident in the drawing. An 1865 pencil drawing, located at Boston College, depicts the fort's backside as viewed from the city. The back seems upright with no slope, with two lower structures on either side. A dock appears to run alongside and extend beyond the length of the battery, and supports a launch. The United State flag flies overhead dating the drawing as shortly after the city was vacated by Confederate forces and occupied by Union troops in mid-February 1865. Seemingly two incongruous drawings, perhaps the latter drawing reflects modifications and improvements upon the battery.

Fort Ripley was also part of a renowned exploit by the black crew of a Confederate steamboat that escaped to the Federal blockaders off Charleston. On the morning of 13 April 1862, sixteen black men, women, and children, led by Robert Smalls, deserted the harbor on the steamboat *Planter*, carrying along four guns destined for the fort. *Planter* was a high-pressure, side-wheel steamer, one hundred and forty feet in length, and fifty in beam, and drew about five feet of water. Built in Charleston, the vessel was used for the transportation of ordnance in the harbor and had recently been withdrawing material from Cole's Island (Hagood 1910:60-61). The four guns destined for Fort Ripley consisted of one 7-inch rifled gun, one 8-inch Columbiad, one 8-inch howitzer, one long 32-pounder, and approximately 200 rounds of ammunition. Besides these weapons, *Planter's* armament consisted of a 32-pounder rifle gun and a 24-pounder howitzer. Following the successful escape from the harbor, *Planter* was outfitted by the Union navy as a gunboat with the same armament: the 32-pounder positioned forward and the 24-pounder located aft, and retained Smalls as a navy pilot (*ORA*, ser. 1, vol. 14, no. 1:13-15; *ORN*, ser. 1, vol.12:820-826; *The New York Herald* 18 May 1862).

Archeological Investigations

Today the remains of Fort Ripley are marked by a navigation sign warning of the danger of the rock obstruction. During low tide, broken bricks and ballast stones protrude above the surface to reveal the location of the fort (Figure 11). On 25 March 2009, MRD conducted a magnetometer and side-scan sonar survey around the battery (Figure 12). Survey lanes were run north to south, and east to west, while avoiding the shallow mound area. The north to south lanes were approximately 250 m (820 ft) in length, and the east to west lanes were 245 m (803 ft). Lanes were spaced approximately 10 m (33 ft) apart with a boat speed of between 4-5 knots. The electronic instruments detected a number of magnetic



Figure 11: Top—Magnetometer survey at Fort Ripley (C. Naylor); Bottom—Brick rubble exposed during low tide looking towards The Battery (C. Amer, SCIAA photo).

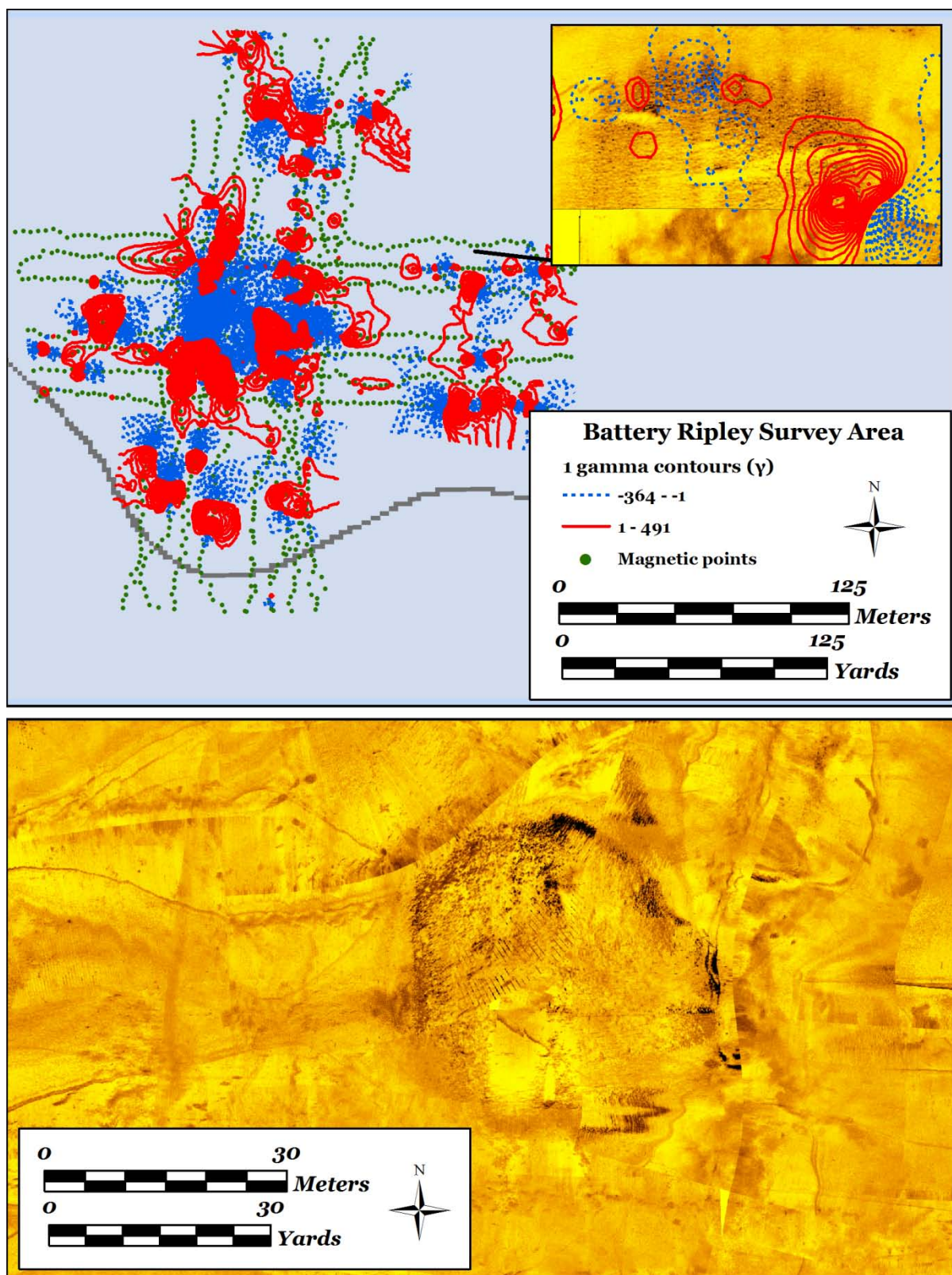


Figure 12: Top—Magnetic contours of Fort Ripley survey area. Inset—Acoustic anomalies (NOAA chart 11524, scale 1:20,000, 1999); Bottom—Sonar image of mound (SCIAA graphics).

and acoustic anomalies around the site. There is a heavy magnetic concentration at the mound, along with a number of large, isolated anomalies in the general vicinity. Acoustic data corresponding with magnetic anomalies revealed several indistinct iron objects. Sonar data revealed the mound measures at the base about 37 m (121 ft) from east to west, and 39 m (127 ft) from north to south. On the western periphery the water at low tide was approximately 12 m (40 ft) deep, while approximately 1.2 m (4 ft) deep on the eastern side.

In an effort to identify the sources of the magnetic anomalies and to determine what else remained of the battery, archeologists dove at the site on 23 April 2010 (Figure 13). During slack low tide, with exceptionally clear water down to 12 m (40 ft), the archeologists circumnavigated the battery, finding the base composed primarily of ballast rocks, and further up an admixture of rocks and bricks. Several iron bars were found accounting for some of the magnetic anomalies detected during the remotes sensing survey. Moving up on the summit, careful examination revealed the presence of several severely eroded and *teredo navalis*-wormhole riddled timbers embedded between the rock and brick matrix. The timbers measured approximately 20.3 cm (8 in) in width, and lengths indeterminable due to their disappearance underneath the rock and brick overburden. These timbers probably represent the bedding frames of the caisson used to secure the battery to its underwater foundation. Nothing else was found on the reconnaissance dive to suggest its past use as an inner harbor defensive structure.

Frame Torpedoes and Obstructions

After the abandonment of Charleston, the Union navy gingerly entered the harbor to begin clearing the pilings, frame torpedoes, and other obstructions. During these clearing operations they encountered four frame torpedoes, mounting 15 torpedoes, at the entrance to the Ashley River, and found them in good condition, along with others in the harbor channels. Many of the frames, however, were found badly worm-eaten and consequently fell apart and sank during the clearing operations. When clearing the Hog Island Channel frame torpedoes, the work party discovered the boom obstruction sunk, but still dangerous at low tide. The boom obstruction consisted of several blocks of wood, comprised of four squared timbers 15 ft long and 1 ft wide banded together, linked together by iron chain. Suspended from each timber balk was a railroad rail. The boom stretched across Hog Island Channel and was covered by Battery Bee and Haddrell's Point Battery (*Report of Secretary of the Navy of 1865:257-260*). In his report on the harbor obstructions, Rear Admiral Dahlgren concluded by stating "...that these several contrivances of obstructions and torpedoes would have been as troublesome as it was expected they would be, in connexion [sic] with the heavy batteries that lined the harbor, and the rebel iron-clads" (*Report of Secretary of the Navy of 1865:263*).

Archeological Investigations

On several occasions, MRD undertook surveys to determine if any evidence of these various defensive structures still remained on the bottom of Charleston Harbor. As mentioned in the reports some of the frame torpedoes fell apart upon recovery and the Hog



Figure 13: Fort Ripley underwater images. Top—Brick rubble; Bottom—Eroded timber (C. Amer, SCIAA photos).

Island boom obstruction was found sunken. Besides those frame torpedoes removed by the Union navy, perhaps older frames from Confederate replacement operations lay on the bottom, as well as the wooden stumps associated with the Folly Island Channel row of piling obstructions. The 1865 harbor chart that was georeferenced for this project is a product of the Union navy's efforts to map and clear the Confederate defenses of the harbor.

Overlaying the map on modern nautical charts provided a starting point to search for these remains of Confederate resolve to defend the harbor. On preparing the survey areas, MRD found that the Castle Pinckney Channel Frame Torpedoes search area was located in the dredged main shipping channel at the intersection of Rebellion and Folly Reaches, and consequently non-existent. Also, the northern portion of the Ashley River Frame Torpedoes search area was located in the dredged channel of the river. Anticipated archeological anomaly signatures of the frame torpedo assembly, included small to medium-sized dipolar magnetic anomalies associated with any loose torpedoes, and acoustic imagery depicting wooden timbers with limited reflectivity and small rock clusters used to anchor the torpedo frames to the bottom. The anticipated acoustic signature of the row obstructions would be roundish objects, perhaps accompanied by a scour, and barely protruding above the surface, with no associated magnetic anomalies.

Folly Island Channel Row Obstructions search area

On 13 March 2009 and 29 September 2010, MRD surveyed the Folly Island Channel Row Obstructions search area (Figure 14). The row obstruction search block measured 1,190 m (1,301 yd) in length and 400 m (437 yd) in width. The survey lanes were spaced 20 m (21.9 ft) apart deploying both a magnetometer and side-scan sonar, with a boat speed of 4-5 knots when using the Marine Sonic sonar unit (13 March) and 6-7 knots when deploying the Humminbird sonar unit (29 September). Water depths ranged from 7.3-22.8 m (8-25 ft) in the row obstruction block. Smooth sediments with an area of sand ridges characterized this search area.

A number of magnetic anomalies were detected in the survey block, primarily in the lower south end of the area, presumably harbor clutter over the years. The largest anomaly had an amplitude of 25 gammas, a duration of 13 seconds, dipolar, and affected a 861 sq. m (1,030 sq yd) area. This anomaly was associated with a very indistinct acoustic target. The remaining magnetic anomalies were of lesser amplitudes. No obvious signs of the row of pilings were identified, but several isolated acoustic anomalies, ranging in size from 0.4-0.05 m (1.3-1.6 ft) met the above criteria and are located in the general georeferenced area of the row obstruction (Figure 15). At the north end of the survey area, a linear object approximately 27 m (88.6 ft) in length and 23 cm (9 in) in width, with no associated magnetic anomaly, is suggestive of a wooden piling, most likely of recent vintage. Future visual inspection is necessary to determine these anomalies affiliations with the row obstructions, or whether they represent natural or other cultural features on the bottom.

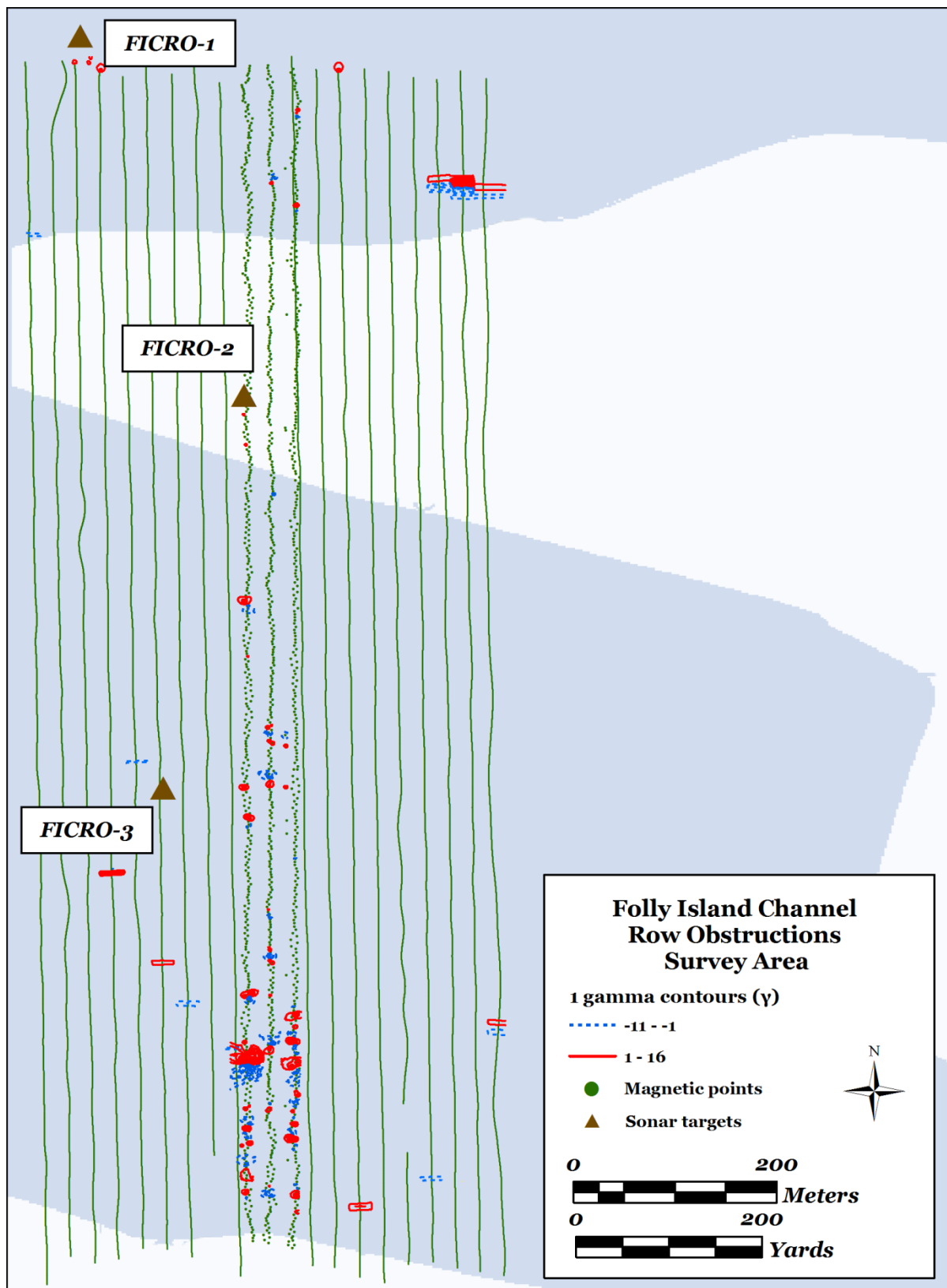


Figure 14: Magnetic contours of Folly Island Channel survey area (NOAA chart 11524, scale 1:20,000, 1999; SCIAA graphics).

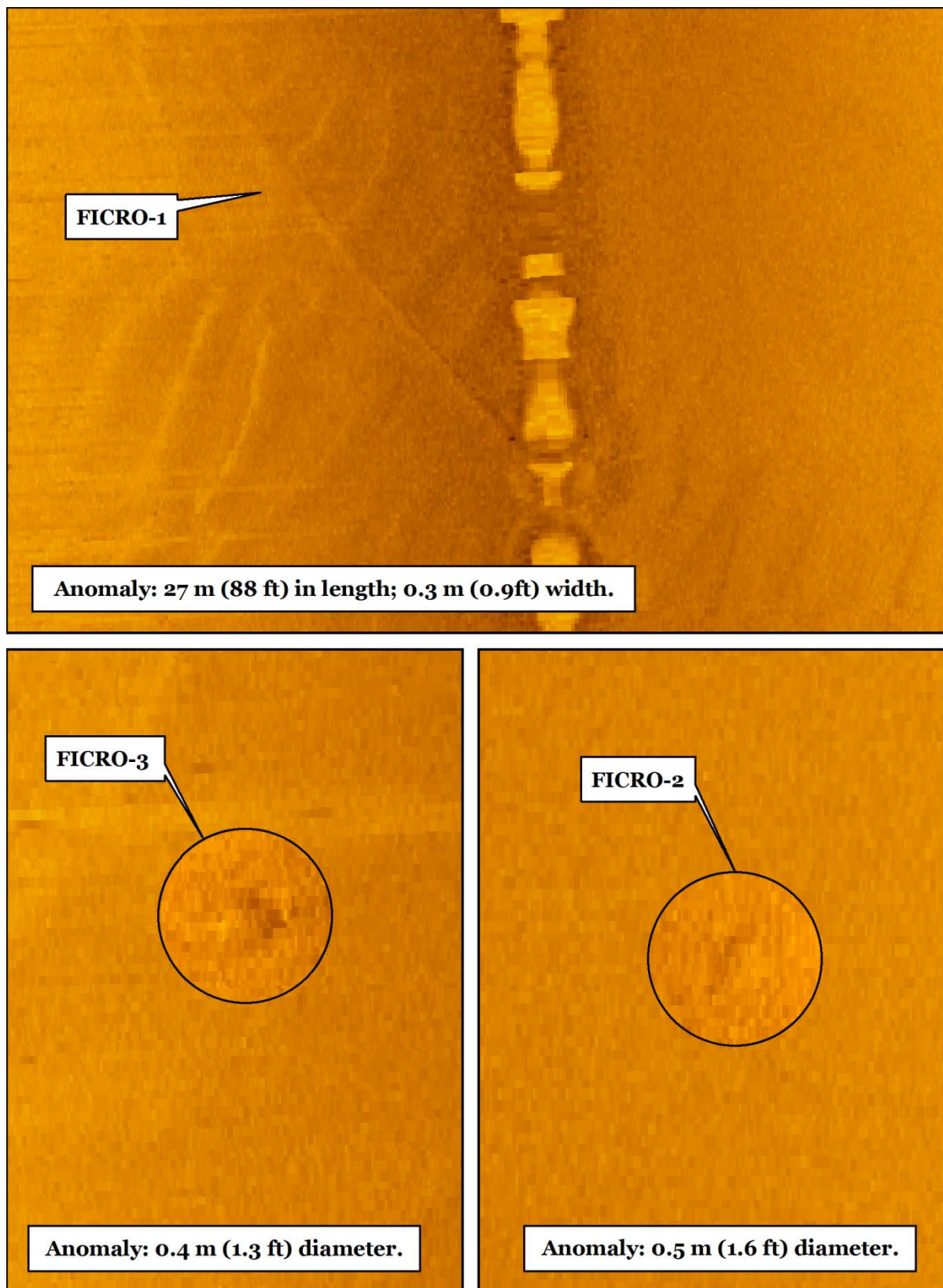


Figure 15: Acoustic anomalies in Folly Island Channel Island Row Obstructions survey area (SCIAA graphic).

Folly Island Channel Frame Torpedoes search area

On 13 March 2009 and 29 September 2010, MRD surveyed the Folly Island Channel Frame Torpedoes survey area (Figure 16). The frame torpedo search block measured 480 m (524 yd) in length and 420 m (459 yd) in width. The survey lanes in both areas were spaced 20 m (21 yd) apart, deploying the magnetometer and side-scan sonar, with a boat speed of 4-5 knots when using the Marine Sonic sonar unit (13 March) and 6-7 knots when deploying the Humminbird sonar unit (29 September). Water depths ranged from 2.4-6.0 m (8-20 ft) in the frame torpedo area.

A number of magnetic and acoustic anomalies were detected in the survey block, primarily in the lower central and west side. Magnetic anomaly FICFT-1, at the lower west side of the survey block continued beyond the range of the survey lanes and had an associated acoustic image. The multi-component anomaly had an amplitude of 54 gammas, a duration of 70 seconds, affected three lanes, and disturbed a 1,765 sq m (2,111 sq yd) area. Water depth at the target was approximately 3.3 m (11 ft). The sonar image revealed a visible object approximately 7 m (7.6 yd) in length and 1.1 m (1.2 yd) in width. Based on the magnetics the object does continue in a northwesterly direction for at least 52 m (56 yd). Adjacent sonar images, however, did not detect the extent of the object which is presumably buried. The object appears modern in nature, perhaps a dredge pipe, and not associated with the frame torpedoes.

Magnetic anomaly FICFT-2 was a small dipolar magnetic anomaly that had a 13.6 gamma amplitude and a duration of 10 seconds. The anomaly disturbed one lane and affected a 337 sq m (403 sq yd) area. Water depth at the anomaly was approximately 3.3 m (11 ft). An acoustic target consisting of two parallel lines 4 m (13.1 ft) long and 1 m (3.2 ft) wide was associated with the magnetic anomaly. This magnetic and acoustic target exhibited the anticipated electronic qualities of a frame torpedo assembly of wood and iron. Visual inspection is necessary to determine whether this anomaly is associated with this type of defensive structure or is simply modern in nature.

The remaining magnetic anomalies are smaller, ranging from 20 gammas to several gammas, having no associated acoustic images, and are therefore presumed buried. These magnetic anomalies may reflect objects of modern vintage or perhaps of archeological interest if associated with loose torpedoes from the frames.

Ashley River Frame Torpedoes search area

On 13 March 2009, MRD surveyed the Ashley River Frame Torpedoes search area. The search area measured 430 m (470 yd) in length and 90 m (98 yd) width (Figure 17). The survey lanes were spaced 20 m (21.9 yd) apart, deploying both a magnetometer and side-scan sonar, with a boat speed of 4-5 knots. Water depths ranged from 1.5-7.6 m (5-25 ft) in the search block. The northern extremity of the survey block extended into the dredged channel of the Ashley River. Numerous small magnetic anomalies, but no discernible acoustic images, were detected in the survey block. The magnetic anomalies ranged from 14 gammas

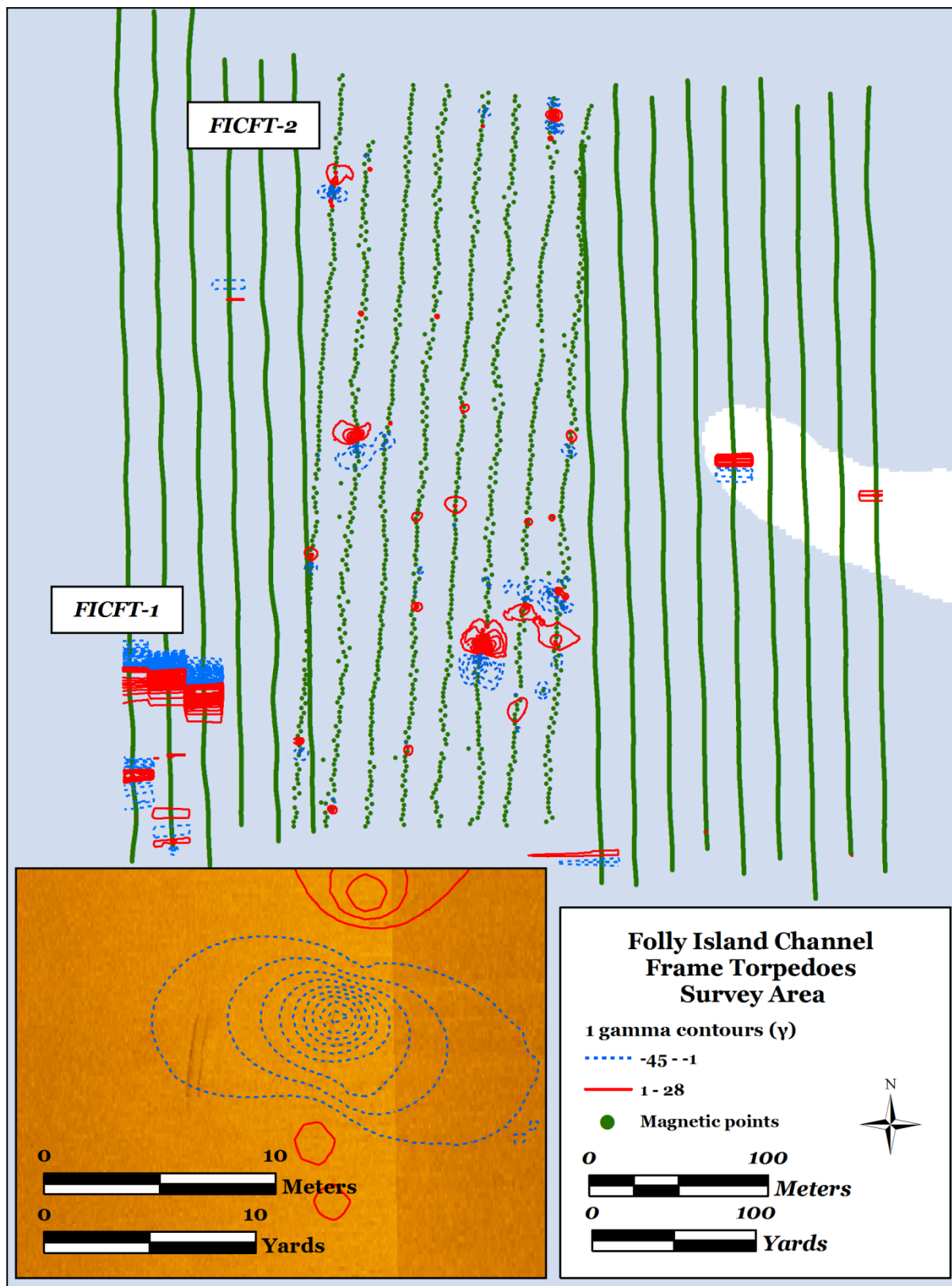


Figure 16: Magnetic contours of Folly Island Channel Frame Torpedoes Survey Area. Inset-Acoustic image of FICFT-2 with magnetic overlay (NOAA chart 11524, scale 1:20,000, 1999; SCIAA graphics).

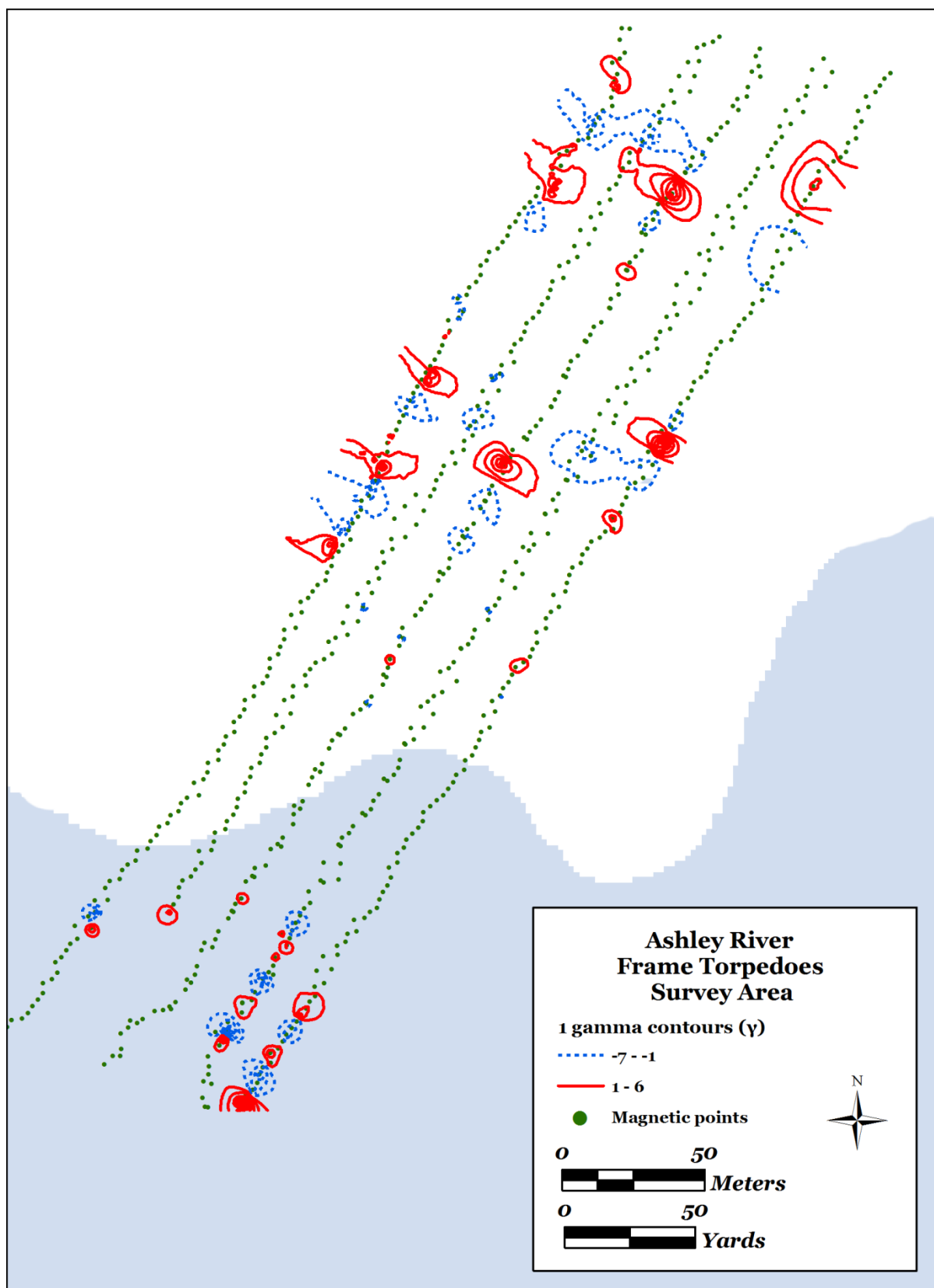


Figure 17: Magnetic contours of Ashley River Channel Frame Torpedoes survey area (NOAA chart 11524, scale 1:20,000, 1999; SCIAA graphic).

to several gammas. No evidence for the frame torpedoes was detected in the survey block, and the magnetic anomalies most likely represent modern ferro-magnetic materials.

Hog Island Channel Frame Torpedoes and Boom search area

Hog Island Channel Frame Torpedoes and Boom Obstruction search area was surveyed on 29 September 2010 (Figure 18). The search block measured 575 m (628 yd) in length and 190 m (207 yd) in width. The survey lanes were spaced 20 m (21.9 yd) apart and a boat speed of 4-5 knots. The magnetometer and Humminbird sonar were deployed. Water depths ranged from 0.9-4.6 m (3-15ft) in the search block.

Analysis of the magnetic data revealed predominately small magnetic objects and one linear anomaly spanning the entire width of the survey block. There was one large magnetic anomaly, 1000-plus gammas, to the west of the linear anomaly. Review of the sonograms revealed several small acoustic anomalies but did not detect the source of the linear magnetic anomaly. The large magnetic anomaly may be associated with the cable or an isolated ferro-magnetic object. The lack of an acoustic image with the long linear and large magnetic anomaly suggests the sources are buried. The strong, cohesive nature of the magnetic anomaly indicates that a utility cable crossing which is not marked on the charts is probably the source of the target.

In conclusion, despite definite proof of the archeological presence of any of the frame torpedo frames or the boom structure, several potentially significant acoustic and magnetic anomalies were detected. At some future date, these targets should be investigated to determine their source or relevance to the battlefield.

Steamer *Etiwan*

The 132-ton side-wheel steamer *Etiwan* was built in Charleston in 1834. By late 1836, the steamboat was offered for sale and described in the papers as being a well-built vessel of 100 feet in length on deck, 18 feet in beam, and 6 feet 6 inches in depth of hold. The steamboat had a copper sheathed bottom, copper fastenings, and copper boilers. An English-built low pressure engine powered the steamboat. The steamboat was equipped to accommodate a number of passengers, and the slave crew was also part of the sale (*DANFS*; Lytle and Mitchell 1975:67; Mueller 1986:415). During the Second Seminole War, *Etiwan* transported US army troops to Florida on several occasions in 1836 (Mueller 1986:410). During the interlude between the Second Seminole War and Civil War, the steamboat peacefully plied the coastal waters of South Carolina transporting passengers and cargos (*The Charleston Daily News* 7 December 1854). In 1846, *Etiwan* helped to save a portion of the cargo, sugar and other items off the Spanish bark *Jacoba* after it struck the South Breakers in tow of the steamer *William Seabrook* while seeking safe haven at Charleston from a storm (*New York Daily Tribune* 25 September 1846).

With the outbreak of the Civil War, *Etiwan* transported labor and material about the harbor for the Confederate government (*The Charleston Mercury* 8 June 1864). Besides these mundane duties, *Etiwan* ventured out of the harbor in support of various operations,

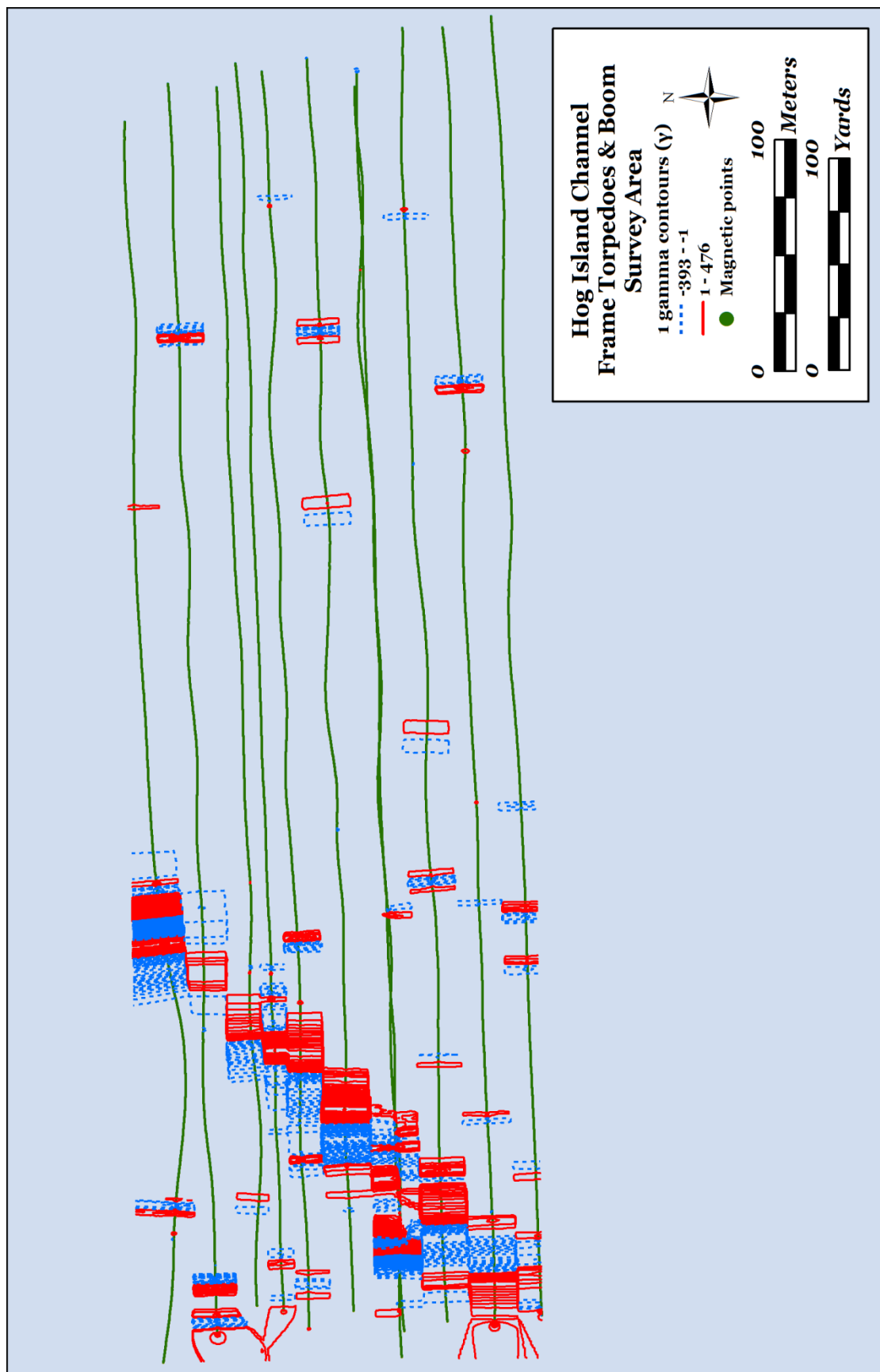


Figure 18: Magnetic contours of Hog Island Channel Frame Torpedoes & Boom survey area (NOAA chart 11524, scale 1:20,000, 1999; SCIAA graphic).

including as one of the consorts to the Confederate ironclads as they attacked the Federal blockaders on 31 January 1862, as well as assisting in towing a grounded blockade runner, *Memphis*, off the beach at Sullivan's Island in June 1862 (*The Charleston Mercury* 2 February 1863; 24 June 1862). *Etiwan* aided in the efforts to recover the two *Keokuk* guns by towing the old Rattlesnake Shoal Lightship to the wreck (Johnson 1890:63-71; *The Charleston Mercury* 6 May 1863). At one point while transiting the harbor, the steamer fell afoul of the rope obstructions between Fort Moultrie and Fort Sumter after drifting atop of them. When starting its engines one of the paddlewheels became entangled in the ropes and jammed, but was eventually freed from its predicament to continue its mission (*ORN*, ser. 1, vol. 16:411).

In the early morning of 7 June 1864, *Etiwan* apparently struck a torpedo between Fort Johnson and Fort Sumter (*Report of Secretary of the Navy of 1865*:258-259). The captain quickly grounded on the shoal between the two forts to prevent the vessel from sinking in deeper water. At daylight, Union gunners at Fort Putnam on Cummings Point discovered the stricken vessel and promptly began firing at the steamer. Shells started to hit the vessel with great effect, including carrying away the smokestack and breaking the upperworks. Thirty shells hit the hull and caused the steamer to sink in the water level with its main deck. A Northern newspaper reported "...and in less time than it occupies to pen this paragraph, they put so many shot through her hull that it would have been difficult to determine if it ever formed a portion of a steamer. She was riddled into fragments..." and "The hull of the steamer is so thoroughly shattered our men could get an unobstructed view through the apertures made" (*New York Times* 20 June 1864). Overall, the Federal batteries at the tip of Cummings Point fired 267 shells at the steamboat. Confederate batteries returned a heavy fire on the Federal batteries (*ORA*, ser. 1, vol. 35 (part 1):12; (part 2):115). The captain had stayed aboard until the steamer started falling apart (*The Charleston Mercury* 8 June 1864).

Archeological Investigations

According to the *Dictionary of American Naval Fighting Ships* the vessel was found wrecked in the harbor after the Confederate withdrawal, raised, and then fitted and used for torpedo clearing operations by the US Army Quartermaster's Department. In April 1867 the steamer was reportedly sold and re-documented as the steamer *St. Helena* (*DANFS*). Disbelieving that a wooden steamer "riddled into fragments" was raised for use after resting on the harbor floor for nearly a year or more, the MRD on 26 March 2009, undertook a survey to locate the remains of *Etiwan*. The survey area was positioned by using the georeferenced 1865 map to place the shipwreck on the modern nautical charts of the harbor. A search area measuring approximately 470 m (513 yd) in length and 385 m (421 yd) in width encompassed the presumed location of the shipwreck. Survey lanes were run north to south, spaced 20 m (21.9 yd) apart, with a boat speed of 4-5 knots, deploying both the magnetometer, sampling every 0.5 seconds, and Marine Sonic side-scan sonar (Figure 19). Water depth at the survey block ranged from 2.4-9.1 m (8-30 ft). A number of magnetic and acoustic anomalies were detected in the survey area. A continuous magnetic disturbance affects the entire lower or south end of the survey area. Acoustic imagery of a submerged dredge pipe assembly revealed the source of the magnetics at this end of the survey block, and NOAA nautical chart 11523 shows the area as a cable and pipeline area (Figure 20).

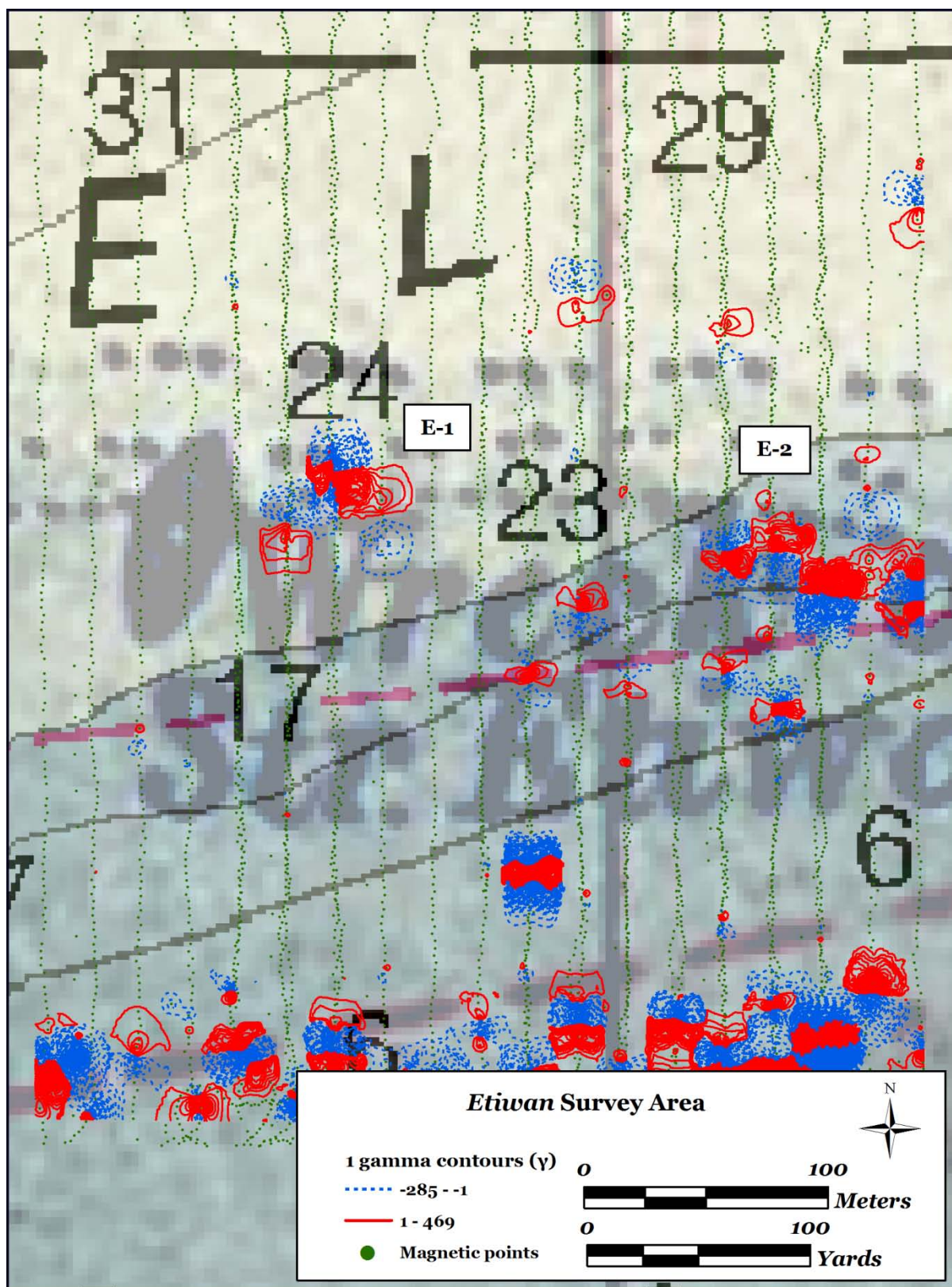


Figure 19: Magnetic contours of Etiwan survey area. 1865 nautical chart transparent overlaid modern NOAA nautical chart (US Coast Survey 1865; NOAA chart 11524, scale 1:20,000, 1999; SCIAA graphic).

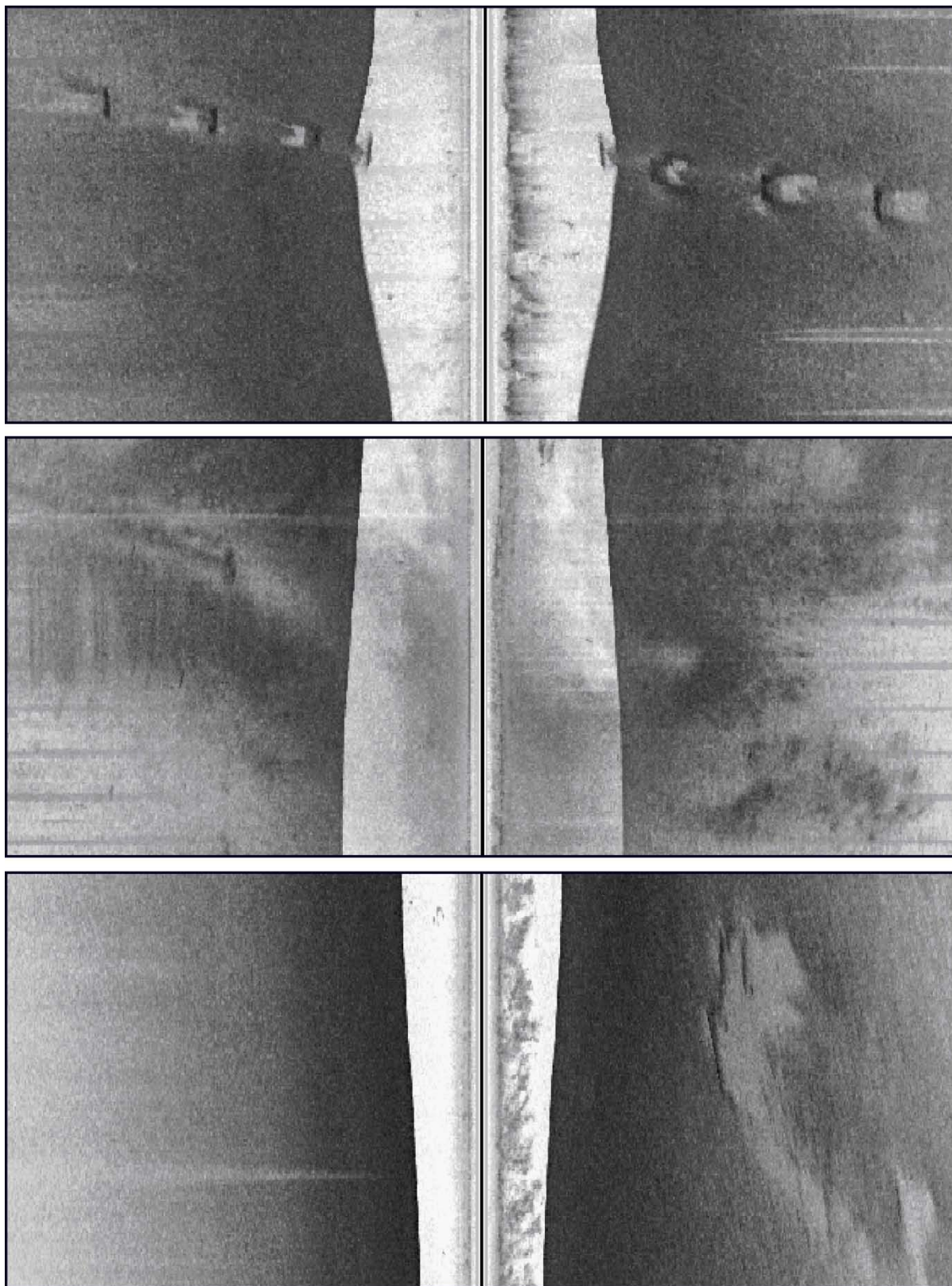


Figure 20: Sonar images from Etiwan survey area. Top—dredge pipes; Middle—dredge pipe (E-1); Bottom—Presumed shipwreck instead four dredge pipes (E-2) (SCIAA graphic).

Two magnetic anomalies in the middle area of the survey block, however, proved of special interest, E-1 and E-2. Based on the proximity of the georeferenced position of the shipwreck, E-1 seemed the most promising candidate as indicating the remains of *Etiwan*. Target E-1 was a 70 gamma multi-component anomaly that had a duration of 20 seconds. The anomaly disturbed three lanes and a 3,340 sq. m (3,995 sq yd) area. Water depth at the target was 6.7 m (22 ft). Side-scan sonar, however, revealed a cylindrical acoustic target associated with the magnetic anomaly, most likely associated with a dredge pipe. Target E-2 was a 210 gamma multi-component anomaly that had a duration of 33 seconds. The anomaly disturbed five lanes, although it appears to continue beyond the eastern survey area border, and a 4,706 sq. m (5,629 sq yd) area. Water depth at the target ranged from 3.0-6.0 m (10-20 ft). Initial side-scan sonar imagery did not reveal any discernible acoustic target associated with the magnetic anomaly.

On 23 April 2010, MRD revisited the *Etiwan* search area using the Humminbird sonar. Sonar this time detected an acoustic anomaly at magnetic anomaly E-2. The sonograms revealed an area of several linear and squared objects protruding above the bottom. The maximum length of the acoustic anomaly is 34 m (112 ft) and a maximum breadth of 9.7 m (32 ft). The magnetic and acoustic target suggested the remains of a shipwreck, perhaps *Etiwan*, had been located. On 23 September 2011, MRD archeologists dove on the suspected remains of the shipwreck. During a circle search the archeologist encountered four dredge pipes that seem to account for the sonar imagery thought to represent a shipwreck.

Despite not locating the remains of *Etiwan* in the primary survey area, the MRD believes the shipwreck still lies somewhere between Forts Sumter and Johnson. As mentioned above, the *DANFS* and other sources claim the steamboat was raised for use by the quartermaster's department, and then sold and re-registered as the steamer *St. Helena* in 1867 (*DANFS*, Lytle and Mitchell 1975:67, 191; Shomette 1973:264-265; Spence 1984:636; Gaines 2008:145). MRD reasons that the near complete destruction of the steamboat, coupled with lying sunk on the harbor floor for at least eight months, rendered the vessel incapable of further service. Continued historical research to confirm this supposition seems to have positively corroborated our view of *Etiwan*'s unlikely raising and subsequent reincarnation as another steamer.

The first piece of historical evidence was found in a newspaper account about a harbor excursion that took place on 22 May 1867 aboard the steamboat *Eliza Hancox*. The steamboat passed the ruins of Fort Sumter, Moultrie, and the Federal fortifications as it cruised the harbor. Another item of curiosity to the passengers on the cruise was the wreck of the steamer *Etiwan* which was pointed out by Captain W. T. McNelty, the captain of the vessel when it sank in 1864 (*The Charleston Daily News* 23 May 1867). Another important temporal link to dispel the relationship between the wreck of *Etiwan* and steamboat *St. Helena* was again found in the newspapers. In August 1867, in one column of the paper was an advertisement by the US Army Quartermaster's Department soliciting bids to purchase several shipwrecks, presumably for scrap, in the harbor and throughout the state—one of the wrecks for purchase was *Etiwan*. In the next column over and adjacent to the Army advertisement was an advertisement for passage to Georgetown, SC aboard the steamer *St.*

Helena (*The Charleston Daily News* 28 August 1867). The information derived from the newspapers, that is, the former captain of the steamboat pointing out the wreck in May 1867, and the advertisement to purchase the wrecked *Etiwan* and the itinerary of *St. Helena* appearing in the same August 1867 edition, seems to support the MRD's belief *Etiwan* did not metamorphosis into *St. Helena*.

The next potential issue is that perhaps the wreck of *Etiwan* was removed from the harbor floor by a salvor. During the Naval Wreck Survey, MRD investigated the remains of the army transport *Boston*, which was one of the wrecked vessels out for bid at the same time as *Etiwan* (*The Charleston Daily News* 28 August 1867). Sonar images of the wreck indicate a substantial portion of the lower hull remains (Spirek and Amer 2004:237-243). What is missing from the site, however, is the machinery and boilers. Additionally, survey of the remains of the blockade runner *Ruby*, another of the vessels offered for sale in the same advertisement, undertaken by the MRD in support of this grant detected a substantial magnetic anomaly at the supposed wreck site. This tends to sustain the notion that the purchase of *Boston*, *Ruby*, *Etiwan*, and the other wrecks was for salvage purposes, most likely for the large iron components and any other metal of value, and not to reclaim the services of the vessel. The salvage activity that occurred in the harbor after the war appears to have left substantial portions of the wrecks from the Civil War remaining on the harbor floor, and despite any salvage operations on *Etiwan*, that it too remains on the harbor floor. Additional survey and ground-truthing operations are required to weed through the modern magnetic overlay of discarded dredging equipment to pinpoint the shipwreck between Forts Sumter and Johnson.

Outer Harbor Defenses

The main geographical feature, the throat or gorge of main harbor entrance, served as the focal point of the offensive and defensive operations in this area of the battlefield. This locale of the battlefield was associated with the Federal naval attack that occurred on 7 April 1863 in the harbor throat and left in its wake several archeological remnants. These battlefield components included the remains of the Federal ironclad *Keokuk* sunk a day after the battle off the sound end of Morris Island, the *Weehawken* torpedo raft cast asunder during the battle, and the battleground of the dueling Federal ironclads and Confederate fortifications. USS *Patapsco* met its fate at the harbor throat during torpedo clearing operations late in the war. Several Confederate and Union batteries or forts on Morris Island now lay underwater, most notably Battery Wagner and Fort Shaw. The Union's Marsh or Swamp Angel Battery sits on the edge of a small creek masked by marsh foliage, as does the Confederate unfinished battery, known by the Union as Payne's Dock or Wharf, and the shipwreck *Manigault* at the mouth of the same creek. Each of these components signifies important events in the struggle to maintain and assault the harbor (Figure 21).

7 April 1863 Naval Battlefield

From an archeological viewpoint, this area of the naval battlefield was a focal point of intense cannon firing, similar to a more traditional land battle, such as Gettysburg or

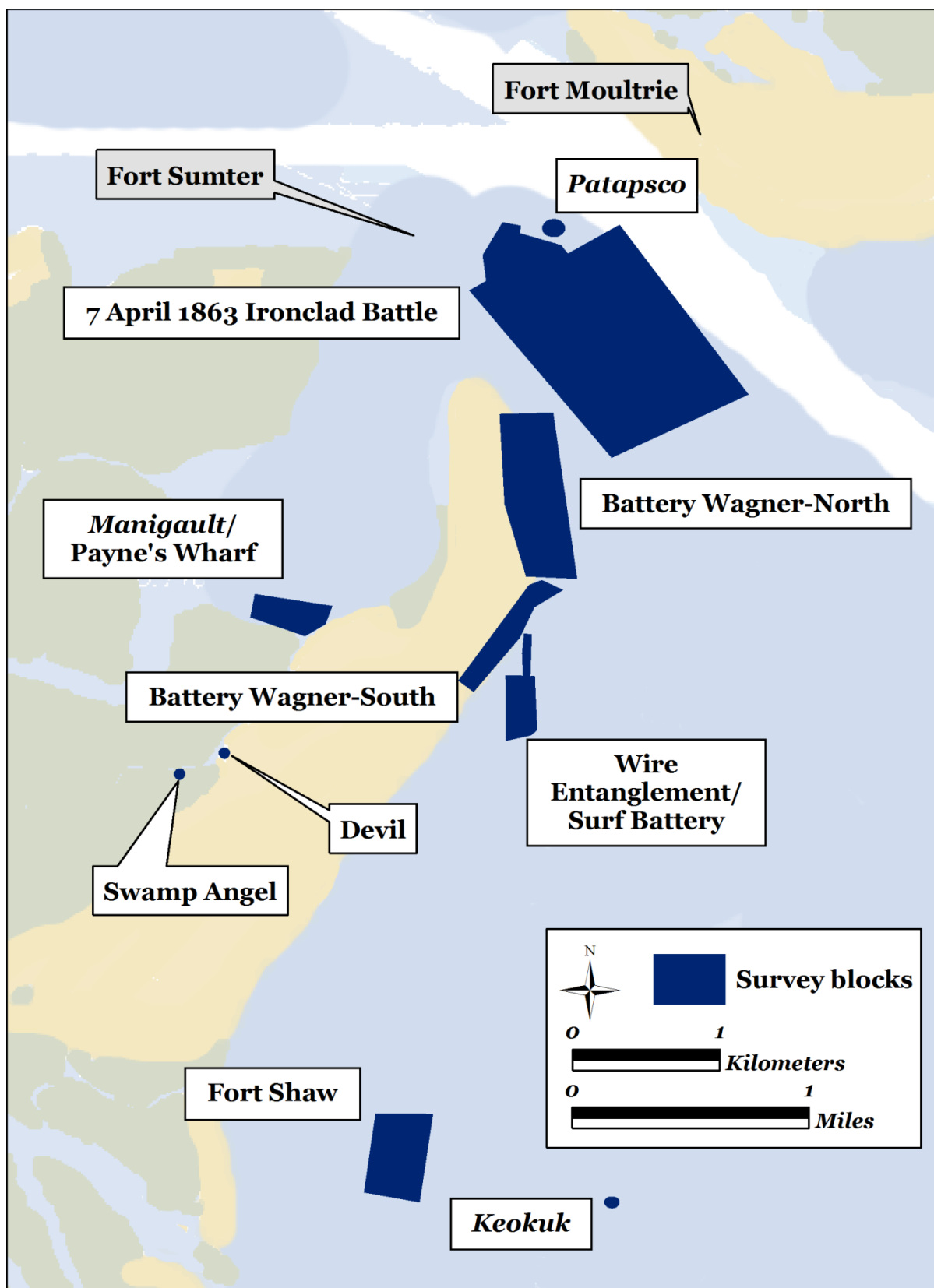


Figure 21: Outer Harbor Defenses survey areas (NOAA chart 11521, scale 1:80,000, 2010; SCIAA graphic).

Shiloh. Rather than shooting at individuals moving by foot or mounted on horses, the shooting on this battlefield was directed towards individuals aboard Federal ironclads. As described by eyewitness accounts, the water was rent with burst shell and shot fragments striking and ricocheting off the ironclads, and “Projectiles generally broke in pieces, as could be seen by fragments falling in the water, or bounded from the vessel”(ORA, ser. 1, vol. 14:248). These fragments along with whole shot and shell then fell to the bottom of the harbor. In an attempt to locate these remnants of the battle, MRD georeferenced a map drawn by Major William Echols, a Confederate engineer, depicting the battle (See Figure 7, ORA, ser. 1, vol. 14 (part 1):251) and placed it on modern nautical charts. Ranges mentioned in Confederate after-action reports helped to situate the battlefield on the modern charts. They reported *Keokuk* approached the closest at 900 yard, while the other ironclads were at the closest within 1,100-1,300 yards, to Fort Sumter (ORA, ser. 1, vol. 14:241-242). Federal reports claimed a closer and “easier” distance to Fort Sumter of approximately 550-800 yards (ORN, ser. 1, vol. 14:6). These claims were vigorously disputed by Beauregard as a matter of pride that the Union ironclads were repulsed and suffered extensive damage at a greater distance (ORA, ser. 1, vol. 14:244-245). Major Johnson, CSA, stated the Confederate estimations were correct due to the prior placement of gun range buoys that marked the channel in contrast to Union naval commander’s judgments that were restricted by their view through the pilot houses (Johnson 1890:60). Another important consideration and potential augmentation to the magnetic record in this area was the numerous firefights between the ironclads and Forts Sumter and Moultrie after the 7 April 1863 battle, especially the major gunfight during *Weehawken*’s grounding in early September 1863 (ORN, ser. 1, vol. 15:549-557).

Archeological Investigations

Using the magnetometer as the primary electronic instrument to survey the naval battleground, MRD hoped to accomplish two objectives: 1) detect the sunken assemblage of shot, shells, and iron fragments associated with the battleground, and 2) determine which account, Union or Confederate, was the most accurate. Obviously, objective two was perhaps a chimerical quest, but the intense two and a half hour “iron storm” was directed at a focal point and worth the effort to find out if the archeological record, if evident, matched the historical accounts. MRD included both Confederate and Union ranges in preparing the survey to account for discrepancies between the two, as well as any errors introduced in georectifying the map.

Over several days, 24 March 2009 and 11-12 March 2010, MRD surveyed approximately 1,645 m (1,799 yd) in length and 939 m (1,026 yd) in width survey block totaling 1.6 sq. km (0.6 sq. miles) (Figure 22). Survey transects were spaced 20 m (21.8 yd) with a boat speed of approximately 6-7 knots. During post-processing, if any magnetic patterns were detected, subsequent survey using tighter lane spacing would refine the data. No side-scan sonar was deployed. Water depth ranged from 1.5-14 m (5-45 ft). Several modern-era navigation markers, one still in operation near Fort Sumter, and two others abandoned and apparently sunken, lay within the confines of the survey block and clouded the magnetic record. The two abandoned towers are marked on the 1999 edition of the Charleston Harbor nautical chart 11524 but are not shown on the 2010 editions. A large

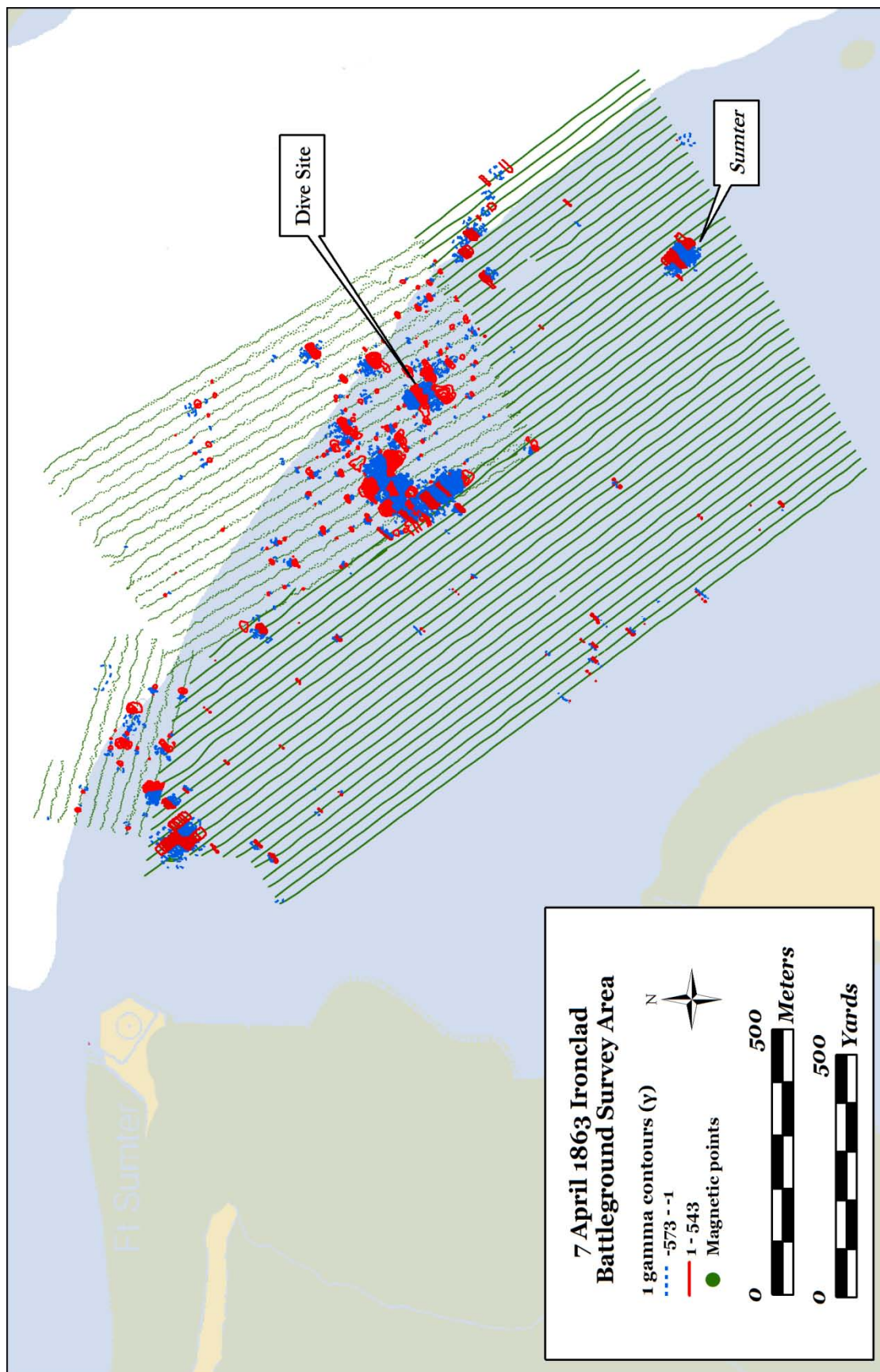


Figure 22: Magnetic contours of 7 April 1863 Ironclad Battleground survey area (NOAA chart 11524, scale 1:20,000, 1999; SCIAA graphic).

number of magnetic anomalies were detected in the survey block ranging in amplitude from 10-55 gammas, discounting the navigation markers. There are two areas of high spatial magnetic intensity in the survey block, one to the northwest near Fort Sumter and the other from the north central area and tapering to the southeast.

To undertake analysis of the magnetic data, several GIS layers were prepared to ascertain any patterning suggestive of the battleground. Six layers corresponding to the four Confederate and Union ranges of the ironclads from Fort Sumter were created, and two additional Confederate ranges from Fort Moultrie; specifically, the 550 and 800 yard ranges proclaimed by the Union ironclad commanders, and the 900 and 1,300 yard ranges from Fort Sumter, and 1,200 and 1,500 yard ranges from Fort Moultrie reported by the Confederates. The measurements were taken from the modern nautical charts at the angle of the northeast and southeast walls of Forts Sumter and Moultrie, respectively. Echols map was also placed as a layer and then traced to create polygon shapes representing the reported positions of the ironclads. The illustration depicts the magnetic contours overlaying the six ranges shown as transparent circles. The Federal ironclad positions are outlined, with the position of *Keokuk* and *New Ironsides* labeled, which demarcate the lead and rear vessels of the ironclad assault column. The wreck of *Patapsco* is distinguished as a check to the distances approached by the ironclads that day. *Patapsco* advanced in line between Fort Sumter and Fort Moultrie before striking a torpedo and sinking in early 1865. The two abandoned navigation markers are noted, as well as the active marker near Fort Sumter (Figure 23).

What becomes visually apparent is the great concentration of magnetic anomalies within and beyond the ranges of the Fort Sumter 1,300 yards and Fort Moultrie 1,500 yards. Of course, the two abandoned navigation markers are located within this region to compromise the magnetic record. The other cluster of magnetic anomalies lays within and around the 500 yard Union range. The preponderance of the magnetic anomalies, discounting those associated with the navigation markers, are clearly in the 900-1,300 ranges and beyond. At this point, while seeming to indicate the battleground is in this area, only visual inspection of a number of the anomalies would provide the necessary proof. Again, other naval and battery firefights over the course of the war may also be reflected in the magnetic contours of this part of the battlefield.

On 29 March 2010, archeologists dove on an anomaly cluster just beyond the 1,300 yard range to determine its relevance, if any, to the naval battle. The largest anomaly in the cluster had an amplitude of 500-plus gammas and a duration of 21 seconds covering about 1.4 sq km (0.5 sq m). Other anomalies in the cluster had amplitudes ranging from 18-27 gammas. The cluster was chosen due to the number of associated anomalies suggesting the presence of small to medium-sized ferro-magnetic objects. Sonar revealed no acoustic imagery of the magnetic target but did reveal a bottom composed of sand ridges approximately one meter (3 ft) high. Water depth at the anomaly was approximately 3.7 m (12 ft) Using a 15.2 m (50 ft) circle-search to identify the target, an archeologist equipped with a metal detector located an abandoned crab trap as the source of the magnetic anomaly, with no other nearby objects detected. This was the only anomaly investigated in the battleground due to project priorities. Additional work is needed to identify the sources of

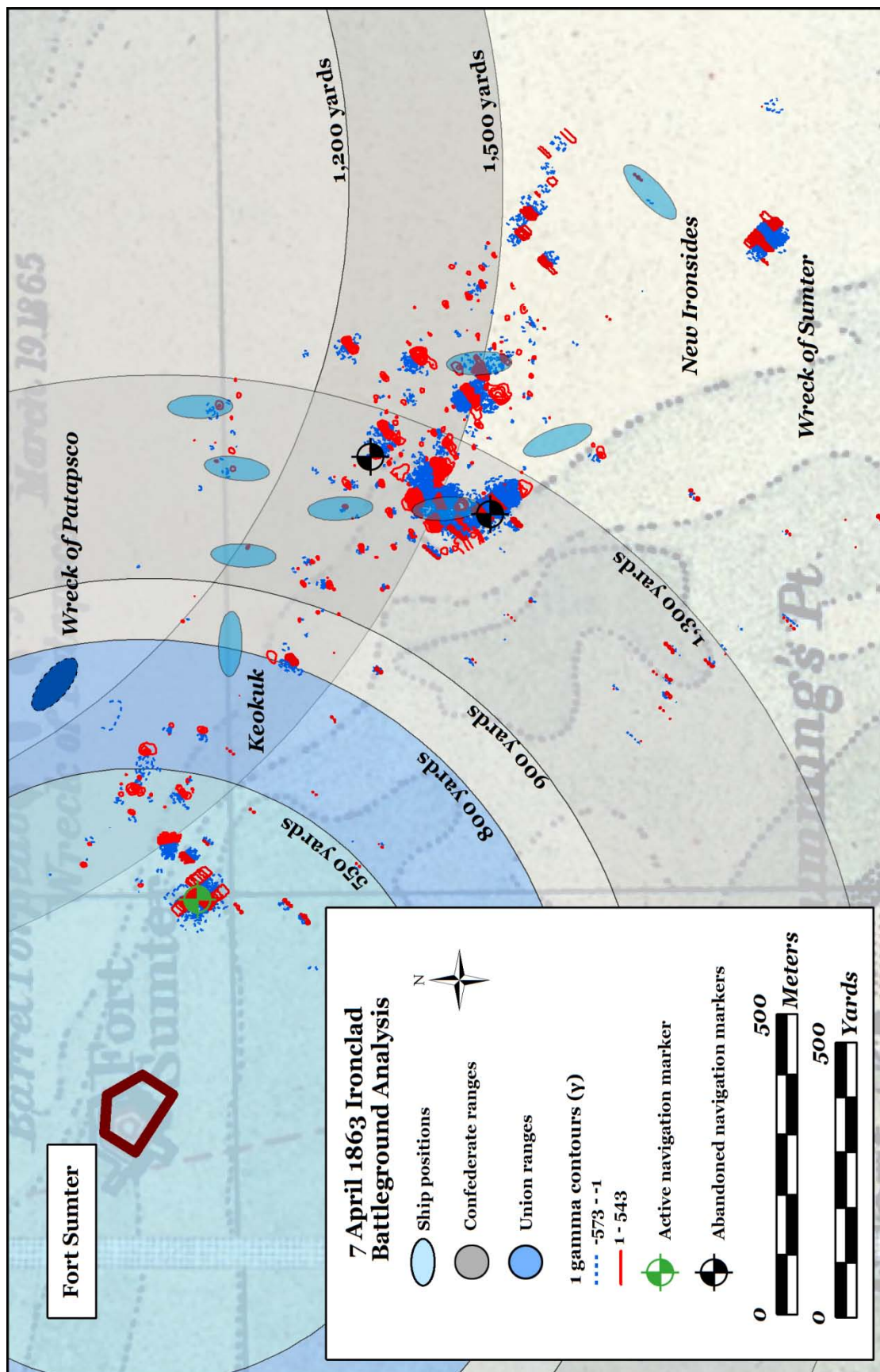


Figure 23: Analysis of magnetic contours and proposed ironclad positions based on Echols map of 7 April 1863 Ironclad Battle ground survey area (US Coast Survey 1865; ORA, vol. 14:251; SCIAA graphic).

these many magnetic anomalies and their association, if any, with the events surrounding the 7 April 1863 ironclad incursion into Charleston Harbor.

During the course of surveying the battleground, MRD also detected a magnetic anomaly located previously by Ralph Wilbanks during an investigation to locate the HMS *Actaeon*, sunk during the Revolutionary War in 1776, and tentatively identified as the remains of the Confederate steamboat *Sumter*. The steamboat *Sumter* was a harbor transport of unknown size that was sunk by friendly fire on the night of 30 August 1863. Fort Moultrie mistook the Confederate steamer as a Federal ironclad and fired a number of shells killing several men and causing the steamboat to ground. The steamboat was declared a total loss (*ORA*, ser. 1, vol. 28:702-704). Known to lay 2.4-3.0 m (8-10 ft) below the sediments, MRD deployed a sub-bottom profiler to gain a better understanding of the size and depth of the magnetic anomaly. Using 10 and 3.5 Khz frequencies, a reflector approximately 2.4-3.0 m (8-10 ft) deep and 44 m (144 ft) in length was detected (Figure 24). The length measurement roughly corresponds to the anticipated dimensions of a shipwreck. More work is necessary to determine if this object is indeed the Confederate transport.

USS *Keokuk*

The 677-ton, double-casemated and twin-screwed ironclad USS *Keokuk* was launched at New York City by contractor Charles W. Whitney on 6 December 1862. The warship was an experimental design, and a newspaper article reporting on *Keokuk*'s initial sea trials on 24 February 1863 deemed the vessel "the strangest looking vessel afloat" and commented "No ship of her shape had been under fire, and the scientific world will await with interest her conduct in battle" (*New York Times* 25 February 1863). The ironclad was 159.5 feet long, 36 feet wide, depth of 13.5 feet, and a draft of 8.5 feet. The round casemates, pierced with three gun ports each, were stationary (*ORN*, ser. 2, vol. 1:120). The armor consisted of horizontal iron bars alternating with strips of wood and sheathed with sheet iron for a total thickness of 5.75 inches. The vessel was armed with two XI-inch Dahlgren smoothbore cannons (*DANFS*, vol. 3:628).

Keokuk upon commission and under command of Captain Alexander C. Rhind was ordered to join the South Atlantic Blockading Squadron at Port Royal, South Carolina. After brief repairs at Hampton Roads, due to fouling a channel marker line with one of its propellers, the ironclad reached Port Royal on 26 March 1863 (*DANFS*, vol. 3:628). The ironclad arrived in time to participate in the planned Federal ironclad attack on Charleston Harbor. Due to the familiarity of the South Carolina coast by Captain Rhind, *Keokuk* and the coastal survey vessel *Bibb*, were tasked with laying marker buoys to guide the ironclads into the harbor. On the day of the attack, 7 April 1863, *Keokuk* was last in the line of battle, but steamed ahead to take the lead following the confusion at the head of the column and Du Pont's signal to disregard the flagship. *Keokuk* shortly found itself the focal point of the cannons at Fort Moultrie, Fort Sumter, Battery Bee, and the other batteries, getting struck ninety times (*ORN*, ser. 1, vol. 14:23-24). According to Rhind, "Every shot that struck the turrets bounded right through from one side to the other. The vessel trembled and quivered. The sound was deafening. On all sides I could see only vast living sheets of flame." The forward gun was directed at Fort Sumter and the after gun at Fort Moultrie. After a few

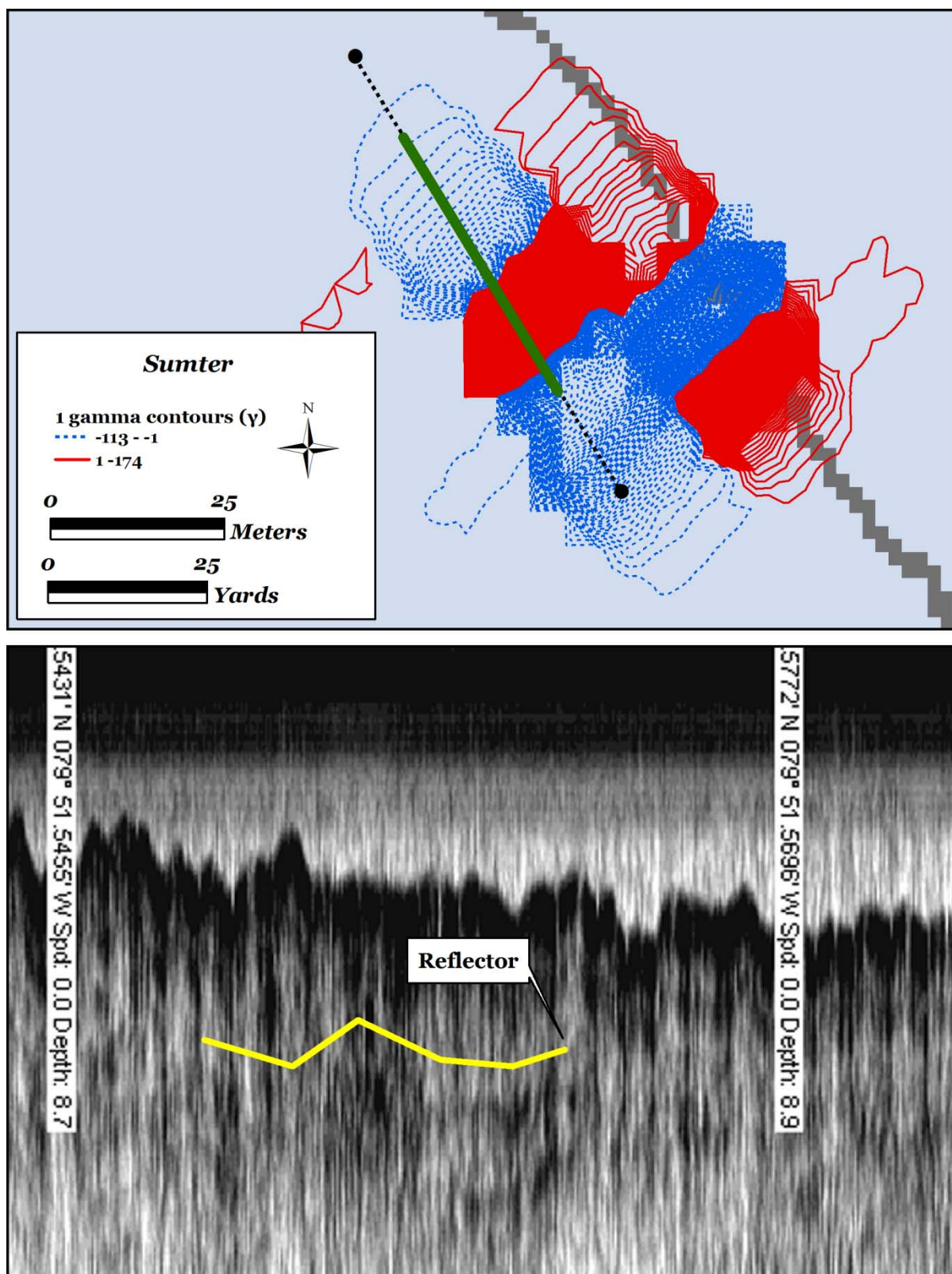


Figure 24: Top—Magnetic contours of potential Sumter shipwreck, and sub-bottom profiler lane (dashed line) and reflector extent (solid line); Bottom—Sub-bottom profiler reflector (NOAA chart 11524, scale 1:20,000, 1999; SCIAA graphic).

moments, Rhind noticed the after gun was not firing, getting no response via the speaking tube, an officer was sent to investigate and reported back that all seventeen officers and men in the after casemate were presumed dead or wounded. *Keokuk* managed to fire only three times at Fort Sumter with the lone gun in the forward casemate until the weapon became disabled by jumping off its slide. Retreating back to the Federal anchorage, Rhind reported the vessel's damages, including an iron plate torn off near the water line and eighteen holes close to the water line, and a number of wounded sailors. The vessel was also rapidly taking on water. A heavy swell arose the next morning and the riddled ironclad sank at anchor. Rhind in retrospect declared "The *Keokuk*'s armor protection was little better than no armor at all; in fact, I believe it was worse than none" (*ORN*, ser. 1, vol. 14:23-24, 27; *The New York Times* 5 February 1893).

Keokuk lay about a mile off from the south end of Confederate-controlled Morris Island, with the casemates just awash at low water. The wreck was in full sight of the Union fleet in the daytime. The Union advance line on Folly Island was less than a mile away and well below the Confederate batteries on the south end of Morris Island (*The New York Times* 19 February 1893). The wreck of the *Keokuk* was also seen plainly from Fort Sumter. During the latter period of the ebb-tide the turrets were just visible above the water (Johnson 1890:63). On the following day many pieces of the *Keokuk* furniture, with the spyglasses and other effects of its officers, washed ashore on Morris Island. Informants stated most of the items were covered with clotted blood (*The Charleston Mercury* 10 April 1863). Other spoils of war obtained by Confederate scouts inspecting *Keokuk* included rammer springs, lanterns, and other items for use on CSS *Chicora* (*ORA*, ser. 1, vol. 14:277).

Du Pont ordered the destruction of *Keokuk* using a second Ericsson raft, but the effort was abandoned on account of the ringbolts used to direct the raft pulled out of the timbers, and in the general difficulty of managing the raft by the monitors (*ORN*, ser. 1, vol. 14:44; 47; 57; 141). Federal engineers deemed salvage of the guns impossible and halted efforts to destroy the sunken ironclad. After several nocturnal inspections the Confederates believed the guns recoverable; subsequently Beauregard ordered an effort to recover the *Keokuk*'s two 11-inch guns. Superintended by Brigadier General Roswell Ripley, the salvors first cut through the two turrets with hammers and chisels and then rigged the guns for removal. Terrain assisted the effort as the backdrop of the sandhills of Morris Island blinded the Federal blockaders from seeing or suspecting the enterprise to recover the guns. The harbor steamer *Etiwan* towed the old hulk Rattlesnake Shoal Lightship to the *Keokuk* to recover the guns. The recovery operation was completed in three weeks and publicly announced on 6 May 1863 (Johnson 1890:63-71; *The Charleston Mercury* 6 May 1863).

The two trophies of war were then used to augment the defenses of Charleston. One of the guns was mounted on the walls of Fort Sumter at the eastern angle of the barbette battery, remaining there until after the ironclad attack of 1-2 September 1863. This gun was then moved and placed in Battery Ramsay at White Point Garden. The other was mounted at Battery Bee and took place in the severe action of 8 September 1863 and remained there until the city's evacuation. They were the two heaviest guns in the harbor, with the exception of the two Blakely rifles (Johnson 1890:63-71; *The Charleston Mercury* 6 May 1863). The former captain of *Keokuk* was amazed the guns were recovered and concluded "...our

advanced ships must have been asleep” (*The New York Times* 19 February 1893). Today, the *Keokuk* gun used at Fort Sumter is still mounted at The Battery.

Post Wrecking History

In the summer of 1864, Charles Whitney, the builder of *Keokuk*, was attempting to raise the ironclad by building a wooden cofferdam. Delays in constructing the wooden structure caused severe shipworm damage to the wood in place that was not discovered until the pumps were to be used. The contractors hoped to build a new frame, well beyond the high water mark, in another bid to raise the wreck (*ORN*, ser. 1, vol. 15:577; *New York Times* 14 December 1863). Despite the setback to the cofferdam, Whitney apparently persisted in his attempts to raise *Keokuk* for several years after the war. During a harbor excursion in May 1867, passengers noted a curious machine off Morris Island that was intended to raise the wreck of the *Keokuk* (*The Charleston Daily News* 23 May 1867). After spending three years, and a fortune, according to the newspapers, Whitney ultimately failed to raise the sunken *Keokuk*. Realizing the futility of the efforts, the Federal government awarded a contract to the Monitor Wrecking Company of New York City to salvage *Keokuk* and other vessels off the harbor floor in 1870 (*The Charleston Daily News* 8 January 1870; *New York Times* 19 August 1870).

During an early 1870s survey by the US Army Corps of Engineers, the wreck was found to have 11 feet of water over it and a foot over the casemates. The vessel, which was located on the southern end of Morris Island, was entirely out of the path of any vessel, except for perhaps a stray coaster bound south from Charleston. As the wreck lay out of the primary shipping channels, wreckers had not greatly disturbed the site. Despite this report, the surveyor proposed to remove the wreck to a depth of 15 feet (USACE 1871:581). Authority to salvage *Keokuk* was granted on 3 February 1873, and Benjamin Maillefert was awarded the contract to remove the wreck to 15 feet of water. He paid the US Government \$50 for the privilege of removing the wreck and probably sold the salvaged items at auction (USACE 1871:727-8). By 1874, Maillefert had removed the wreck of the ironclad *Keokuk* to the desired depth (USACE 1874b:4).

Archeological Investigations

During the 1980 NUMA survey, the wreck of *Keokuk* was relocated in 4.5 m (15 ft) of water. *Keokuk* was located with a magnetometer and generated a 1,900 gamma hit. NUMA reported that *Keokuk* was resting 550 meters due west of its plotted position in 1863. Between 25-50% of the vessel was intact according to the divers. Probing indicated that portions of the wreck were buried between 1.2-2.4 m (4-8 ft) below the bottom (Browning and West 1984; Submerged Vessel Synopsis-*Keokuk*, on file at MRD/SCIAA; State Site File).

The remains of *Keokuk* lie buried in the sediments off Morris Island. The wreck is approximately 1.9 kilometers (1.1 mi) due east of the abandoned Morris Island Lighthouse and less than 1.5 kilometers (0.9 mi) NE of the entrance to Lighthouse Creek. Initial MRD

remote sensing investigation of the remains occurred in 2001 using funds from a Department of Defense Legacy Resource Management Program grant administered by the Naval Historical Center. Additional electronic investigations were undertaken by the MRD using funds from the ABPP grant and consisted of using a sub-bottom profiler to detect the buried ironclad. At first, locating the ironclad proved problematical as the coordinates obtained from an 1870 nautical chart and from the NUMA expedition were approximately 400-plus meters away from the actual site. Coordinates provided by a private contractor and a former SCIAA underwater archeologist, Ralph Wilbanks, correctly positioned the wreck 400 m (437 yd) off Morris Island.

Remote sensing operations on *Keokuk* were conducted over two days in 2001 (Figure 25). The Division conducted a brief survey on 23 February to encompass the location shown on the 1870 chart and the NUMA coordinates and after eleven survey transects the results confirmed that *Keokuk* did not lie at either of those locations. A second survey using Wilbanks coordinates was conducted on 11 July. After confirming the presence of a large magnetic anomaly with the magnetometer, MRD set up a survey block approximately 210 m (224 yd) by 180 m (196 yd) over the site. Using 15-meter (16.4 yd) lane spacing, 14 survey lanes were run in a NNW-SSE orientation. An average speed over ground of between 4.5 and 5.5 knots was maintained. Due to the shallow depth of water over the site, the magnetometer sensor was towed on the surface 15.2 meters (50 feet) behind the GPS antenna. Likewise, the side-scan sonar sensor was suspended from a spar approximately two feet below the water's surface. Twelve survey lanes were placed across the block, oriented East-West to refine the magnetic contours. Both the magnetometer and side-scan operation were run concurrently with the sonar set at the 20-meter (21.8 yd) scale providing greater than 100% coverage of the survey tracks.

Figure 25 depicts the magnetic contours of the site using a 100-gamma contour. The area of magnetic influence encompasses approximately 35,000 square meters (41,859 sq yd). The site is composed of a series of multi-component and dipolar magnetic anomalies. The main grouping of magnetic nodes has gamma readings in the 800 to 1900 range, and the highest reading, 1,970 gammas, occurs at the southeast corner of the area of greatest magnetic deflection. The maximum duration of magnetic influence at 1 gamma along the NNW-SSE axis is 79 seconds representing a distance of approximately 175 meters (191 yd), while along the E-W axis the duration was 67 seconds representing approximately 168 meters (184 yd). Various sizable anomalies scattered across the site to the NW likely represent evidence of those salvage activities, as well as natural decomposition and dispersal of the upper hull components by natural forces. While the side-scan sonar operated concurrently with the magnetometer, no visible signs of cultural material, unusual disturbances or perturbations of the bottom sediments were detected. The bathymetry indicates that the wreck lies in approximately 4.5 meters (15 ft) of water with a sea floor that slopes from an average of 4.2 meters (14 ft) to the east of the site to an average of 5.0 meters (16.5 ft) inshore (Spirek and Amer 2004:149-153).

On 11 October 2010, MRD returned with a sub-bottom profiler to determine the depth of overburden and physical extent of the ironclad. Using the magnetic data obtained in 2001 to guide survey operations, a number of 5 m (5.4 yd) survey lanes traveling

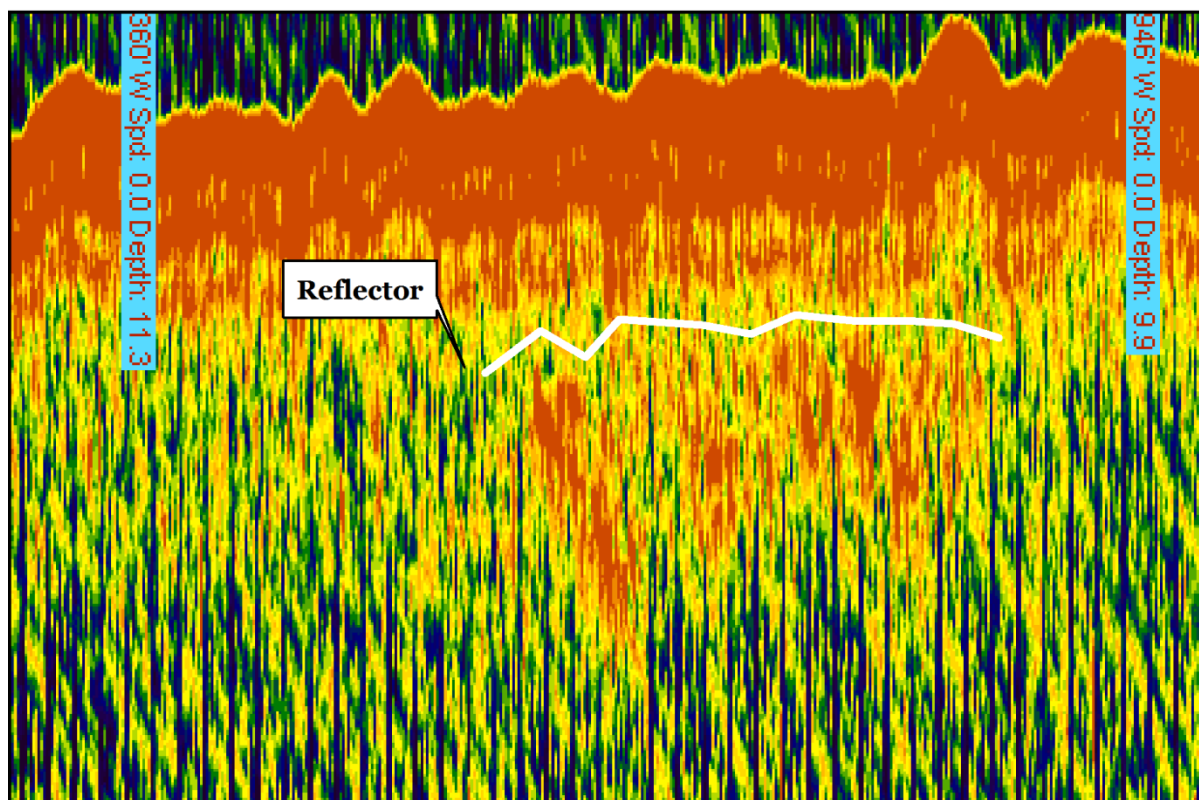
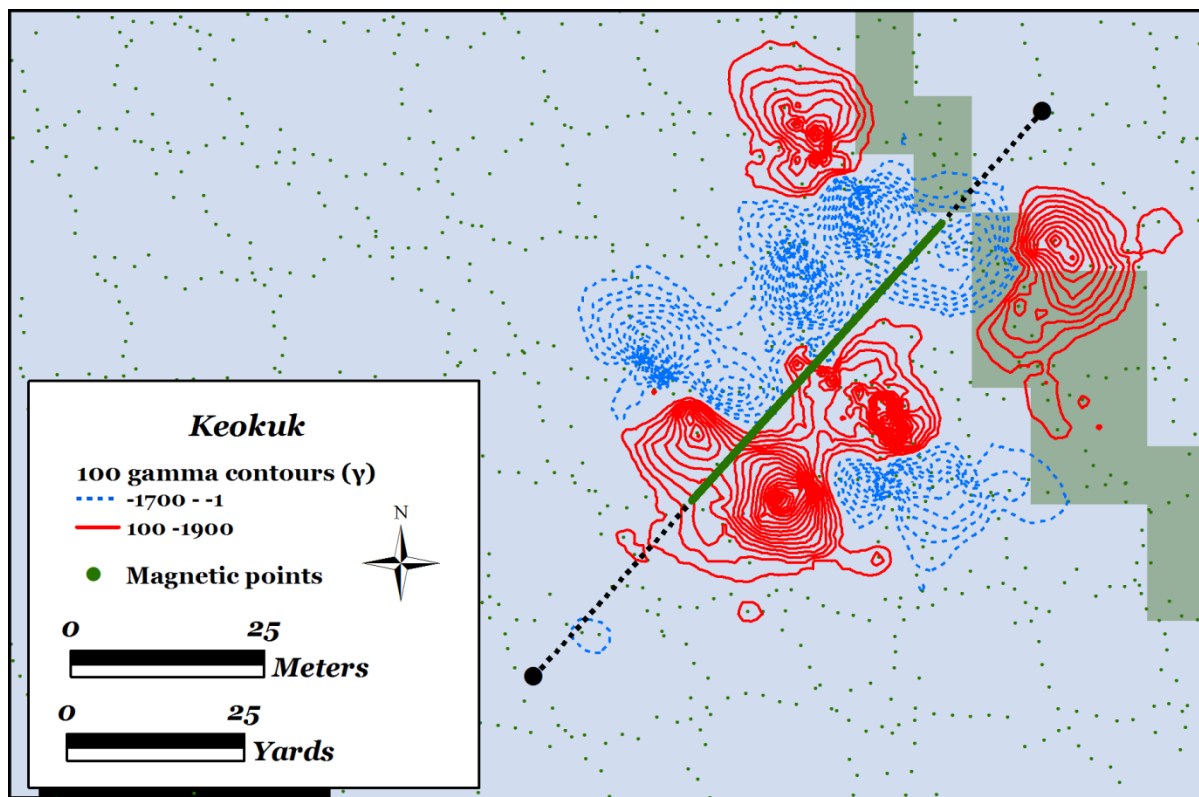


Figure 25: Top—Magnetic contours of Keokuk, and sub-bottom profiler lane (dashed line) and reflector extent (solid line); Bottom—Sub-bottom profiler reflector (NOAA chart 11521, scale 1:20,000, 1999; SCIAA graphic).

approximately NE/SW and NW/SE were undertaken to encompass the wreck site. Several of the sub-bottom profiler transects revealed buried structure (See Figure 25). There does appear to be some vertical relief of the wreckage with depths of overburden from the ocean bottom to the target ranging from 1.3-2.4 m (4-8 ft). Maximum length detected was approximately 44 m (144 ft) on a NE/SW transect. About 4.7 m (14 ft) short of the overall length of the ironclad, most likely a result of Maillefert's salvage operations or a glancing lane along the longitudinal axis of the shipwreck.

All remains of *Keokuk* appear to be buried beneath the sediments as no evidence of cultural material protruding from the site could be identified acoustically. In 2001, Ralph Wilbanks tested the site and suggested that there was some six feet of overburden covering the site (NUMA 2001:3). Correlation of modern bathymetric data recorded during the survey, Mr. Wilbanks' overburden determination, and contemporary descriptions of the depth of water to which the wreck was to be reduced, suggest that the seafloor may have accreted by as much as eight feet at the site. The linear orientation of the magnetic anomalies having the highest intensity, located along the SE side of the site, suggests that the lower hull is likely fairly intact and is oriented along a NE to SW axis. The centers of highest gamma reading at the NE and SW ends of the site is 49 meters (162 feet) which corresponds fairly well with the ship's 159.6-foot length

Ericsson Obstruction Remover, aka "Devil"

As the threat from Confederate obstructions, mines and torpedoes increased during the war, the Union navy searched for counter-measures to these underwater hazards. On 24 October 1862, John Ericsson wrote Gustavus V. Fox, Assistant Secretary of the Navy, referencing a conversation with Mr. Alban C. Stimers, chief navy engineer, about the problem of removing obstructions from a "certain Southern city." Ericsson believed that if piles were the issue in the harbor, then he could devise a butting raft for the monitors to deploy to destroy these obstructions (Church 1890:46). John Ericsson was contracted by the Union navy to design a device to destroy these hazards, and in early 1863 he had fabricated a raft that was attached to the bow of a monitor. The official name of the minesweeper was the Ericsson Obstruction Remover, but known afterwards as the "Devil" by Charleston engineers. As designed by Ericsson, the rafts were made of two layers of 18 inch squared white pine timbers, approximately 50 feet long and 27 feet wide, with a 20-foot V-notch to receive a bow of a monitor. At the bow of the raft, a pair of booms raised and lowered a heavy beam with torpedoes attached. The torpedoes were 11.5 feet long, 10 inches in diameter, contained 350 pounds of powder, and detonated by a trigger board placed parallel to the beam. Copper air chambers between the torpedoes and trigger board directed the blast (Canfield 2000:8). The device was attached by iron chains to the warship. Four of these minesweepers were sent to Charleston in early 1863 (Heidler et al. 2000:595). On 30 January 1863, steamer *Ericsson* left New York with four rafts in tow bound for Port Royal. On the way, during a storm, the vessel lost three of the rafts, managing to arrive with only one (Canfield 2000:8).

Following trials of the torpedo raft on the North Edisto River, the only monitor captain willing to deploy the raft in battle was Captain John Rodgers of *Weehawken*. Finding

the monitor steering no worse or better with the raft attached, *Weehawken*'s captain, however, had the raft's torpedoes removed fearing that upon their explosion it would cause damage to his or other vessels (*ORN*, ser. 1, vol. 14:43). These were replaced with grappling hooks and suspended by chains below the raft. In March, Chief Engineer Alban Stimers returned north to order more rafts built. Despite the monitor captain's opinion, Stimers believed *Weehawken* steered better with a raft rather than without a raft attached (*ORN*, ser. 1, vol. 13:729). As the ironclad deployed for battle on 7 April 1863, one of the grappling hooks snagged the anchor chain causing over an hour delay in the attack, and while leading the vanguard, heavy seas jostled the raft and caused several iron plates to come loose. The raft was then ordered cast adrift (*ORN*, ser. 1, vol. 14:43-44).

The abandoned raft floated for a day after the battle before washing ashore on the Morris Island beach, falling into Confederate hands. The Confederates believed that due to the haste and confusion of the 7 April battle the Union navy had failed to properly secure the contrivance to the monitor (*The Charleston Mercury* 9 April 1863). A curiosity, several contemporary accounts described the much vaunted "Obstruction Destroyer" or "Yankee Devil" beached on Morris Island. A newspaper reporter found a short flagstaff with signaling flag on the raft which was constructed of two heavy tiers of hewn timbers, about 18-inches square, measuring fifty feet long by twenty broad, securely fastened together by numerous bolts. The bow was square or scow-shaped, while the stern was swallow-tailed, made to receive the bow of the monitor. Iron drags, with protruding hooks on either side, were hung beneath, at the bows, and along the sides and connected by chains and designed to break or draw to the surface any wires, entanglements in the vicinity of torpedoes or other hidden obstructions. He took a hook and the flagstaff as a souvenir (*The Charleston Mercury* 14 April 1863; Fremantle 1991:188).

Confederate army engineers also inspected and drew a detailed plan of the raft (Figure 26). They determined correctly that the "devil" had been cut away during the battle, probably a result of it becoming unmanageable. The raft was:

... a massive structure, consisting of two layers of white pine timbers 18 inches square, strongly bolted together; a re-entering angle 20 feet deep to receive the bow of the vessel, 50 feet long, 27 feet wide; a layer beveled timbers on the front, forming a bow; seven heavy iron plates, through which passed chains directly down and over the sides through hawser-pipes; to these were attached grappling irons, with double prongs, suspended underneath, at the sides and bow; in the countersinks of the plates were loose iron rollers, apparently to facilitate the drawing of the chains through the holes over them when the grapplings took hold, to drag up to the "devil" whatever he may catch with his hooks (*ORA*, ser. 1, vol. 14, no. 1:246-256).

Du Pont ordered the destruction of *Keokuk* after its sinking by using a second Ericsson raft. On 9 April 1863, the Confederates read the code implementing this endeavor when *New Ironsides* signaled to "bring the rafts," and observed that the rafts were presently alongside one of the monitors in tow of a tug (*ORN*, ser. 1, vol.14:687). The effort was abandoned on account of the ringbolts used to direct the raft pulled out of the timbers and in

Sketch of the "Devil," or torpedo searcher, carried by a monitor in Charleston Harbor, April 7, 1863.

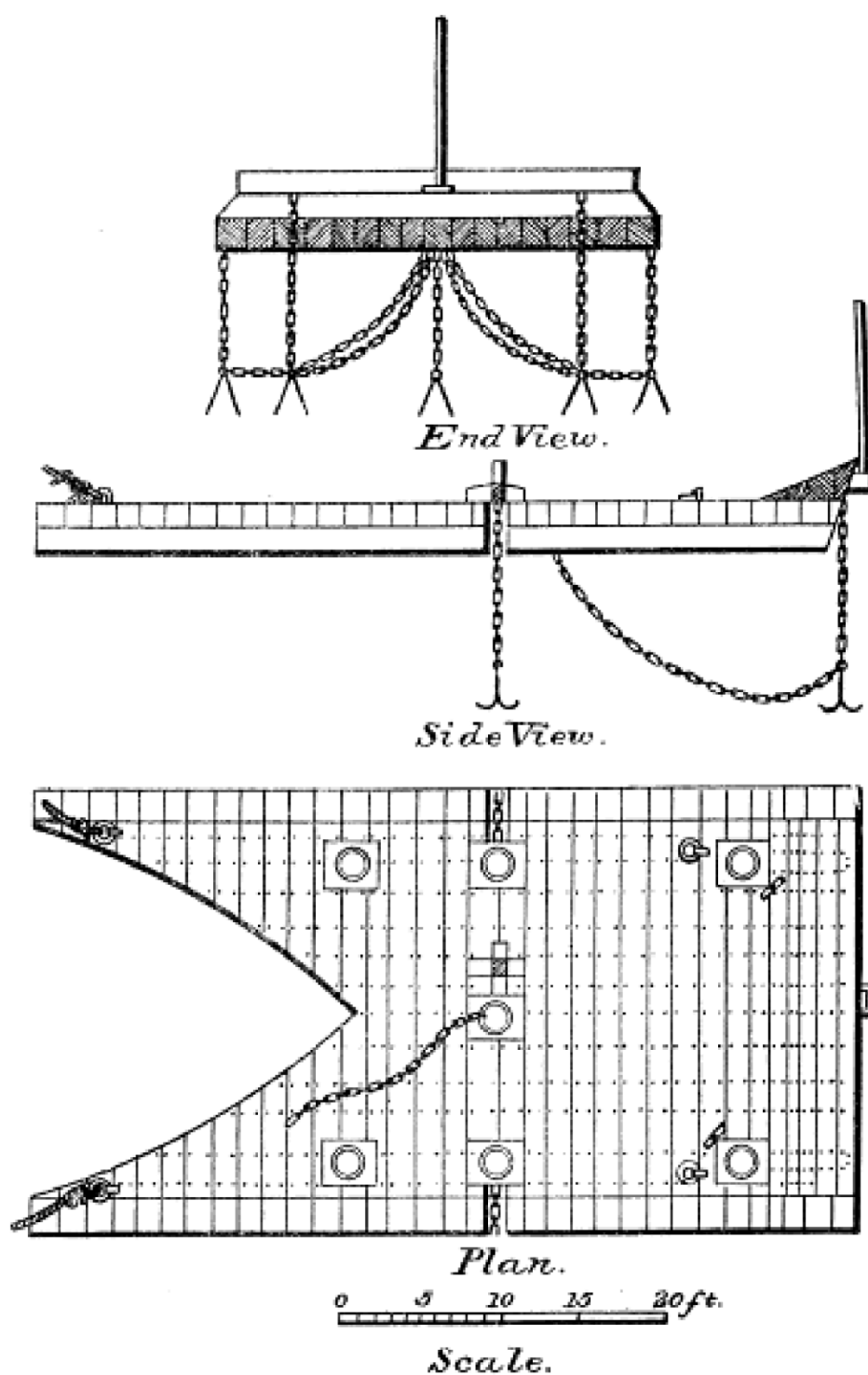


Figure 26: Major W. Echols, CSA, drawing of the "Devil" (ORN, ser. 1, vol. 14:93).

the general difficulty of managing the raft by the monitors (*ORN*, ser. 1, vol. 14:44; 47; 57; 141).

Ericsson wrote in response to Fox about the commander of the *Weehawken*'s view that the obstruction remover was a dangerous threat to his vessel and to other vessels. He requested that Fox should order the captains to use them "The reluctance to employ the rafts amaze me, as the perfect safety against the enemy's torpedoes insured by the bottom scrapers is self-evident" (Church 1890:48-49). By 6 November 1863, trials were again conducted with one of three rafts at the harbor, which was equipped with the large torpedo, 23 feet long and 10 inches diameter filled with 600 pounds of powder, at the front end as Ericsson intended. Fitted to *Patapsco*, the shock of the explosion, while throwing up a large amount of water 40-50 feet in the air, raised the raft about two feet off the surface but was hardly felt by the monitor. The monitor's captain felt certain the obstruction remover could work, but the difficulty of navigation and movement with the raft attached to the monitor, and the complicated nature of deploying the torpedoes, restricted the utility of the device (*ORN*, ser. 1, vol. 15:102-103; LOC-Kloeppel). Despite the success of the sea trials, the rafts were never deployed in an assault on the harbor obstructions.

In 1868, St. David's Island beach watchers in Bermuda found a raft floating offshore and towed it in to Dolly Bay. They planned on salvaging it for the wood, but due to the heavy bolting of the structure abandoned their effort and left it to rot in a cove. In 1872, Captain Edward Faucon, the navy captain of *Ericsson* that had towed the rafts to South Carolina, saw the structure and recognized it as one of the lost Ericsson torpedo rafts. Apparently, the raft had drifted on the seas for six years, having at least one collision with a ship, before fetching ashore in 1868 (Blacknall 1917:301-302). On a visit to Bermuda in 1965, historical researcher Eugene Canfield visited the site and found an extant structure measuring 18 feet by 23 feet, with large fasteners protruding from its surface (Canfield 2000:9).

Another potential torpedo raft had an even more incredible journey, drifting from the east coast to the Gulf of Mexico and eventually washing ashore on Mustang Beach, Texas. Three sections of a massive structure were exposed in the dunes by Hurricane Allen in 1980, and subsequently investigated by several maritime archeologists. This construct had timbers 0.33 m (14 in) square, treenailed and bolted together vertically and horizontally. In a center area, the bolting pattern was very dense, with some standing 0.9 m (3 ft) tall. Based on their interpretation of the structure, they believed the raft had flipped over exposing the large bolts (Smith et al. 1987:149-157).

Archeological Investigations

On 24 February 2010, MRD visited the site of the reported *Weehawken* torpedo raft located on the south bank of Bass Creek behind Morris Island. There are several disarticulated sections of the raft in close proximity to each other in the marsh (Figure 27). One section of the raft is embedded in the marsh bank and is visible during low tide. The largest section rests several meters away in the marsh grass and likely becomes submerged during extremely high tides. Several other smaller sections of the raft are scattered nearby.



Figure 27: Top—Fragments of "Devil" on Morris Island; Bottom—Largest extant section of the construct (SCIAA photos).

Various iron fasteners, including perhaps the hawse pipes from which the grappling hook chains descended through the raft, among other objects of indeterminate function or association, are interspersed among the wooden fragments. Remnants of thin iron sheets were also noted in the wreckage. The wooden fabric of the various sections is severely eroded and weather-beaten. Besides the associated fragments of this wooden construct, modern debris consisting of tires and other items litter the site, and the area also appears to afford a convenient means to access the back side of Morris Island by boaters.

The most extant section is also the largest and most integral and consists of two courses of timbers set perpendicular to each layer. There is one additional layer, however, formed from an individual timber that rises about 30 cm (11.8 in) from and set parallel to the top layer. Basic overall dimensions of this large section are approximately 3.8 m (12.5 ft) in length, 1.7 m (5.5 ft) in width, and 0.5 m (1.6 ft) in height. The bottom timbers in this section are approximately 30 cm (11.8 in) wide and 25 cm (9.8 in) deep. These timbers are also paired together with a 23 cm (9 in) gap between them. The top timbers are about 32 cm (12.6 in) wide and 22 cm (8.6 in) thick. This section also exhibits two types of wrought-iron fasteners: ball-peened drift pins flush with the top timbers and long drift pins protruding about 30 cm (11.8 in) above the wooden fabric. Another disarticulated section of the raft exhibits this same fastening pattern. The heads of the ball-peened fasteners are 5 cm (1.9 in) in diameter and the diameter of the shaft is 3 cm (1.1 in). The exposed fasteners are about 3 cm (1.1 in) in diameter with the top part hammered fairly flat. The ball-peened fasteners are spaced about 17-21 cm (6.6-8.2 in) apart and are staggered in pairs. The exposed drift pins are clustered in groups of several fasteners spaced approximately 40-60 cm (1.3-1.9 ft) and individually spaced from 23-29 cm (9-11.4 in) apart in each grouping. At another isolated section, a “forest” of bent over fasteners about 80 cm (2.6 ft) high protrude out of severely eroded timbers flush with the marsh sediment. Several horizontal fasteners around 3 cm (1.1 in) and spaced from 0.7-1.1 m (2.2-3.6 ft) apart tie the adjacent upper timbers together, and similar fasteners were noted on the bottom course.

Interpreting the remaining structure and comparing the two extant examples from Bermuda and Texas, and the Echols drawing, sheds some light on this heavily-built wooden structure. Examining the photographs of the Bermuda and Texas structures leads one to conclude that the construct in the marsh behind Morris Island is indeed similar. The Echols drawing also reveals what those large drift pins signify in the raft’s construction. The large exposed drift pins seem problematical as they appear nowhere in his drawing. The only place drift pins that large could be found was at the forward built-up section of the raft. This wooden element was perhaps intended to fasten and secure the torpedoes before deploying them underwater. Placed atop and perpendicular to the main deck were four rows of timbers slanting downwards from front to back, or from 0.6 m (2 ft) high to flush with the main deck, covering a distance aft of 1.6 m (5.3 ft). These timbers spanned the width of the raft. The observed exposed fasteners on this structure had heights from 30 cm (0.9 ft) to 80 cm (2.6 ft), including several smaller fasteners protruding between 4-5 cm (1.5-1.9 in) above the deck near these longer fasteners. The height range of these fasteners fits within the slant range of the Echols drawing. The greater height of the longest fasteners, 80 cm (2.6 ft), from the largest height of the forward timber in the Echols drawing is due to the disappearance of the timbers in the “forest” of fasteners, thus exposing more of the drift pins for measurements.

Therefore, this large section of the raft seen in the bottom of Figure 27 represents a cross-section of the construct. The view is looking forward towards the bow, with the bottom pieces, the longitudinal timbers, lying fore and aft and the upper athwart timbers going port to starboard. The long fasteners, along with one timber, represent the third course of timbers at the bow.

To aid in identifying these remains as the *Weehawken* torpedo raft, three wood samples from each of the three courses of timbers were taken. The wood samples were sent to Dr. Lee Newsom at Penn State University for identification. Dr. Newsom analyzed the samples and determined that these three timbers were made from Douglas Fir, *Pseudotsuga menziesii* (Newsom, pers. comm., 25 April 2011). The identification of the wood samples as Douglas fir goes against the historical documents which state the structure was built of White Pine. However, Douglas Fir was widely used in the shipbuilding industry during this time and may have been used by the contractor instead of White Pine. The construct, however, along with the two archeological examples, an eyewitness report and drawing seems to corroborate that this wooden structure is indeed the torpedo raft deployed and cast adrift by *Weehawken* during the 7 April 1863 Union ironclad assault on Charleston Harbor.

USS *Patapsco*

Launched in Wilmington, Delaware on 27 September 1862, the 1,875-ton single-turreted ironclad USS *Patapsco* was a *Passaic*-class monitor. The monitor had an overall length of 241 feet, overall beam of 46 feet, depth of 11.1 feet, and a draft of 11.1 feet. *Patapsco* was originally armed with a 15-inch smoothbore cannon and a 150-pounder Parrott rifle. In October of 1864, two 12-pounders were added to the armament as deck guns to assist in its blockading duties at the entrance to Charleston Harbor. The vessel was commissioned on 2 January 1863, commanded by Daniel Ammen, and assigned to the South Atlantic Blockading Squadron (*DANFS*; “Z” files, Washington Navy Yard).

On 3 March 1863, *Patapsco* assisted in an attack against Fort McAllister near Savannah, Georgia, on the Ogeechee River. During the naval assault, *Patapsco* fired fourteen 15-inch shells and forty-six 150-pound rifle shells at the earthen fort. Only one shot was received from the fort during the fight (*ORN*, ser. 1, vol. 13:720-721). During the 7 April 1863 ironclad attack on Charleston Harbor, *Patapsco* was the fourth monitor in line. At approximately 3:10 PM, *Patapsco* began firing at Fort Sumter at a distance of between 1,500 to 1,200 yards with the 150-pounder. The monitor fired five times each with both of its guns. *Patapsco* began receiving the concentrated fire of the Confederate batteries and forts and sustained several heavy blows to the turret. Inspection of the monitor after the battle determined that 47 projectiles had struck the vessel, especially injuring the smokestack (*ORN*, ser. 1, vol. 14:15-16, 27).

During the attacks on Battery Wagner, *Patapsco* participated by shelling the Confederate battery prior to the failed 18 July Federal assault. As the siege progressed the monitor continued shelling Battery Wagner and Battery Gregg on the north end of the island. *Patapsco* also fired on Fort Sumter and the obstructions through this period. As Union sappers approached Battery Wagner, the monitor maintained a covering fire and finally

participated in the intense shelling of the battery prior to its abandonment by Confederate forces on the night of 6 September 1863. In a bid to take Fort Sumter, *Patapsco* and the other monitors engaged the batteries at Sullivan's Island from 7-8 September, which transformed into a rescue mission to protect *Weehawken*, having grounded in shallow waters between Cummings Point and Fort Sumter (*ORN*, ser. 1, vol. 14:594-595; LOC-Kloppel). A reporter from *The New York Times* visited the navy machine shop at Station Creek, Port Royal and found *Patapsco* and *Weehawken* undergoing repairs from various battle damages. He noted *Patapsco*'s pock-marked turret, the result from Confederate projectiles, which had not penetrated a single layer of iron, although the smokestack was entirely shattered from shot and shell (*New York Times* 14 October 1863).

An important role of the monitors after the fall of Morris Island was the enforcement of the blockade. Stationed off Cummings Point, the monitors formed the inside blockade to thwart the entrance and exit of blockade runners at the throat of the harbor. On the morning of 22 October 1864, *Flora*, an iron-hulled blockade runner, grounded off Fort Moultrie. *Patapsco*, the lead picket monitor, discovering the stranded steamboat commenced firing at the blockade runner and promptly joined by the Union land batteries on Cummings Point. The Union forces swiftly made a wreck of the steamer (*ORN*, ser. 1, vol. 16:29-30, 32; *ORA*, ser. 1, vol. 35 (part 1):108). In November 1864, *Patapsco* opened fire on a small sloop on the beach in front of Fort Moultrie with a 12-pounder Dahlgren boat howitzer. The gun crew hit the sloop twice in 13 shots. The monitor was approximately 2,700 yards distant from the sloop. *Patapsco* got underway and commenced firing with its 150-pounder rifle and then was fired upon by Fort Moultrie using shell and shot. The monitor succeeded in setting the sloop on fire, which the captain believed to contain a cargo of cotton and turpentine. The captain also reported the tide affected the aim of the guns (*Report of Secretary of the Navy of 1865*:301).

On the night of 15 January 1865, *Patapsco* was the lead picket monitor and tasked to cover scout and picket boats that were sweeping the channel for obstructions and torpedoes. Accompanied by an array of launches and tugs, the monitor floated into the harbor on a flood tide up to a line between Fort Sumter and Fort Moultrie. Then the flotilla steamed or were towed back out towards the harbor entrance. The monitor kept its bow pointed out to sea as it drifted stern-first towards the inner harbor. They did this maneuver three times. On the third trip, and despite the precautions of deploying netting around the monitor and having nearby vessels dragging for torpedoes, *Patapsco* hit a torpedo and sank in less than a minute. The captain and those standing on the deck and turret survived, numbering 43 crewmembers, while those below decks, except three, totaling 62 perished. Apparently the explosion occurred at or near the port side ward room, or about 30 feet from the bow. Despite starting the pumps, *Patapsco*'s forward area quickly filled with water and the order to abandon ship was given. The vessel went down bow first, throwing the stern high in the air for an instant before going under, with only the smokestack projecting out of the water. Captain Stephen Quackenbush stated that everybody believed the torpedoes were positioned further into the harbor, and that the crew was not in jeopardy by these maneuvers (*ORN*, ser. 1, vol. 16:176; *Report of Secretary of the Navy of 1865*:313-319). A drenched survivor reportedly remarked, "We were told to dredge for torpedoes, and nobody need cry because we found one" (Cowley 1879:157). After the abandonment of Charleston, Union navy divers recovered thirteen

bodies of the victims drowned at the time of the sinking of the monitor *Patapsco*. The bodies were buried on James Island (*New York Times* 29 May 1865).

Post Wrecking History

In 1870, the Monitor Wrecking Company from New York City was awarded a contract by the US Treasury Department to salvage *Patapsco* and other shipwrecks in the harbor. By the summer of 1870, the company had successfully raised portions of the monitor (*The Charleston Daily News* 8 January 1870; *New York Times* 19 August 1870). A survey of Charleston Harbor in the early 1870s was conducted by Captain William Ludlow, US Army Corps of Engineers. Ludlow found the wreck of *Patapsco* partially blasted by the wreckers with 15 feet of water over it. Ludlow found the channel-way by the shipwreck sufficient for navigation and determined that the wreck should not hinder navigation (*The Charleston Daily News* 11 February 1871; USACE 1874a:3). Despite the assurances of safe passage, the Board of Pilot Commissioners had earlier suspended a pilot who was in charge of the schooner *W. H. Steele* when it struck *Patapsco*, most likely the turret in 1870 (*The Charleston Daily News* 5 March 1870).

A year later the wreck was considered a menace to navigation and a contract was let with Benjamin Maillefert to remove the wreckage to a depth of 25 feet mean low water over the wreck of the monitor. Maillefert was to receive the proceeds from auctioning the salvaged materials from the monitor. At the close of the fiscal year 1871-1872, salvage operations had reduced the wreck to a depth of 19 feet (USACE 1872: 652). When Maillefert began operations, he reported that the pilothouse and the deck over the engine-house had been removed and the turret partially turned over by wreckers prior to his operations. During the operations to break up *Patapsco*, Maillefert forwarded recovered human bones to the Army where they were buried at Fort Moultrie (Bearss 1968). In 1873, Maillefert reported:

The wreck was found standing upright on a level hard sandy bottom, 30 ft. below low water line, a sand-bar had, however, formed forward, or at her bow, reaching to level of the deck, and at the stern, 5 ft. below the deck, so that the armored overhang was just level with the sand. This bar extended but a short distance on each side Owing to the wrecking parties having already operated upon it, the wreck was found in quite a distorted condition The pilot-house had also been removed by the wreckers, but owing to its great weight, while transporting it to Charleston, it broke its heavy chains and was lost . . . subsequently found and recovered. . . [Maillefert's] Operation was carried on systematically, by first removing the entire deck, after which the machinery was taken up, with much difficulty, however, as the hull found entirely filled with sand and mud. Next the boiler, powder-magazines, and their contents, were in turn taken up. . . several copper tanks were found to contain ready-made cartridges, perfectly dry Next the armored sponsons, or overhangs, on each side were broken up into sections, averaging 25 ft. in length The next labor was directed against the revolving iron turret (USACE 1874a:7-8).

A newspaper article reported on Maillefert's operations and described his lighter discharging a load of sheathing plates, huge bars, cranks, cogs, and other miscellaneous items. There was also a section of turret about 10 feet by 5 feet and twelve inches thick. The section bore the indentations of the Confederate projectiles. Another component raised was the bow consisting of oak about five feet thick and covered with six inches of iron sheathing (*The Charleston Daily News* 28 January 1873).

Wreckage of *Patapsco* was relocated by the NUMA survey in 1981 and visually investigated in 1982. During the initial ground-truthing a diver surface-collected a large coal fragment from the site and noted the presence of several 15-inch shells (Browning and West 1984; *Patapsco* State Site file). In 1985, two salvagers from Florida, Howard Tower and Larry Tipping, expressed an interest in salvaging the site. In preparation of issuing a potential salvage license, SCIAA requested use of the US Army Corps of Engineers, Charleston District's side-scan sonar and crew to survey the remains of *Patapsco* (Alan Albright to F.L. Smith, 18 January 1985, letter on file at MRD/SCIAA). Side-scan sonar operations were undertaken 25 January 1985 with USACE staff, Tipping and Tower, and SCIAA staff. They located the remains of the wreck and made several passes over the site (Larry Tipping to Mary Ann Sullivan, [nd] 1985, letter on file at MRD/SCIAA). On 23 February, a SCIAA archeologist and Tower dove on the site with the objective to relocate, identify, and delimit the site. The divers encountered several indeterminate objects of encrusted iron concretions and pieces of wood approximately 10 to 12 inches wide, and some structure standing two feet off the bottom, and bits of coal. The bottom was composed of sand, shell and clay, with mud in depressions (*Patapsco* Dive Report, David Brewer, 23 February 1985, report on file at MRD/SCIAA; Hobby diver report Lic. #357 [H. Tower], 1 March 1985, report on file at MRD/SCIAA).

In a March 1985 letter to the Navy seeking permission from the Navy Department to work on the site, Tower proposed excavating the wreck under the supervision of SCIAA (Howard Tower to Judge Advocate General, Navy Department, March 24, 1985, letter on file at MRD/SCIAA). On 8 April 1985, the Office of the Judge Advocate General denied permission to excavate the wreck citing the long standing policy of not permitting salvage operations on sunken US Navy ships that are the final resting place of crewmembers (R.J. McCarthy to Howard Tower, 8 April 1985, letter on file at MRD/SCIAA). Subsequently, Tower dropped his plans to excavate at the site.

In the late 1990s, plans to widen the channel into Charleston Harbor created a dilemma, as the exact position of *Patapsco* was uncertain. The State Archeological Site Files maintained by SCIAA had three different coordinates for the remains of *Patapsco*. Clarification by SCIAA of the wreck's position, discussed below, erased fears that the monitor was in the impact zone of the widening project.

Archeological Investigations

The remains of *Patapsco* lie approximately 700 m (765 yd) east of Fort Sumter and 1,000 m (1,093 yd) southwest of Fort Moultrie. Initial MRD remote sensing investigation of the remains occurred in 2001 using funds from a Department of Defense Legacy Resource

Management Program grant administered by the Naval Historical Center. Remote sensing operations on *Patapsco* were conducted on 21- 22 February 2001. Prior to commencing the survey, MRD had at least three sets of coordinates all showing different locations for *Patapsco*. The state site files had the wreck plotted in the shipping channel. Coordinates provided by archeological contractors, Gordon Watts and Ralph Wilbanks, located the wreck slightly west of the channel on the 27-foot contour. The 1870 Charleston Harbor chart showed the site to the west of the channel lying on the 30-foot contour. Faced with these different locations and discounting the channel location as spurious, MRD opted to begin the survey at the 1870 location and then cover the Watts/Wilbanks location. A 430 by 150-meter (470 by 164 yd) block consisting of ten 15-meter (16.4 yd) lanes was completed without magnetic or acoustic acquisition of the target in the 1870 location. Lanes ran approximately parallel to the bathymetric contours of the seabed oriented NW to SE. A second 100 by 400-meter block (109 by 437 yd), oriented parallel to the first block, was set up to the west and north of that block using 45-meter (49.2 yd) lanes as a means of detecting the site rapidly. The sonar range was set to the 50-meter (54.6 yd) scale to provide complete coverage of the survey tracts. On 22 February the site was detected magnetically and acoustically. The point of steepest magnetic gradient centered 492 meters (538 yd) NNW of the point shown on the 1870 chart (Figure 28).

Once the site was located, an additional lane was set up equidistant between the two lanes bracketing the site, creating a lane spacing of 22.5 meters (24.6 yd) over the site. With the sonar set on the 20-meter (21.9 yd) scale and using the 22.5-meter (24.6 yd) lane spacing, several lanes were re-surveyed resulting in good acoustic images of site components that were above the bottom grade. Seven lanes oriented NE to SW were set up over the site resulting in several more good images and a refinement of the magnetic signature.

Figure 28 depicts the magnetics of the site using a 100-gamma contour encompassing a roughly 24,000 square meter (28,703 sq yd) area, although the anomalies having high gamma readings cover less than one-third of that area. The site is composed of a series of dipolar and multi-component magnetic anomalies. The main grouping of anomalies having the greatest gamma readings lies along a NW-SE orientation. The majority of those anomalies have gamma readings in the 500 to 700 range, with a maximum reading of 954 gammas on an anomaly located towards the NW extent of the site. The maximum duration along this axis is 74 seconds representing a distance of approximately 122 meters (133.4 yd), or a little over twice the vessel's length of 57.8 meters (63.2 yd). The maximum duration along the NE-SW axis is 43 seconds representing a distance of approximately 103 meters (113.6 yd). Many of the outlying anomalies have gamma readings in the 200 to 500 range. While the significant magnetic readings are presented above, the influence of the site on the earth's magnetic field (readings greater than 2 gammas) can be detected farther out, in places as far as 60 meters (65.6 yd) beyond evident anomalies. The side-scan sonar revealed the wreckage of the ironclad. All the objects observed in the sonar images cover an area of approximately 589 square meters (704 sq yd) centered on the magnetic region of steepest gradient on the site.

Both the magnetics and the acoustic images suggest the hull of the wreck lies along a NW-SE orientation at the 28-foot bathymetric contour line. While the majority of the

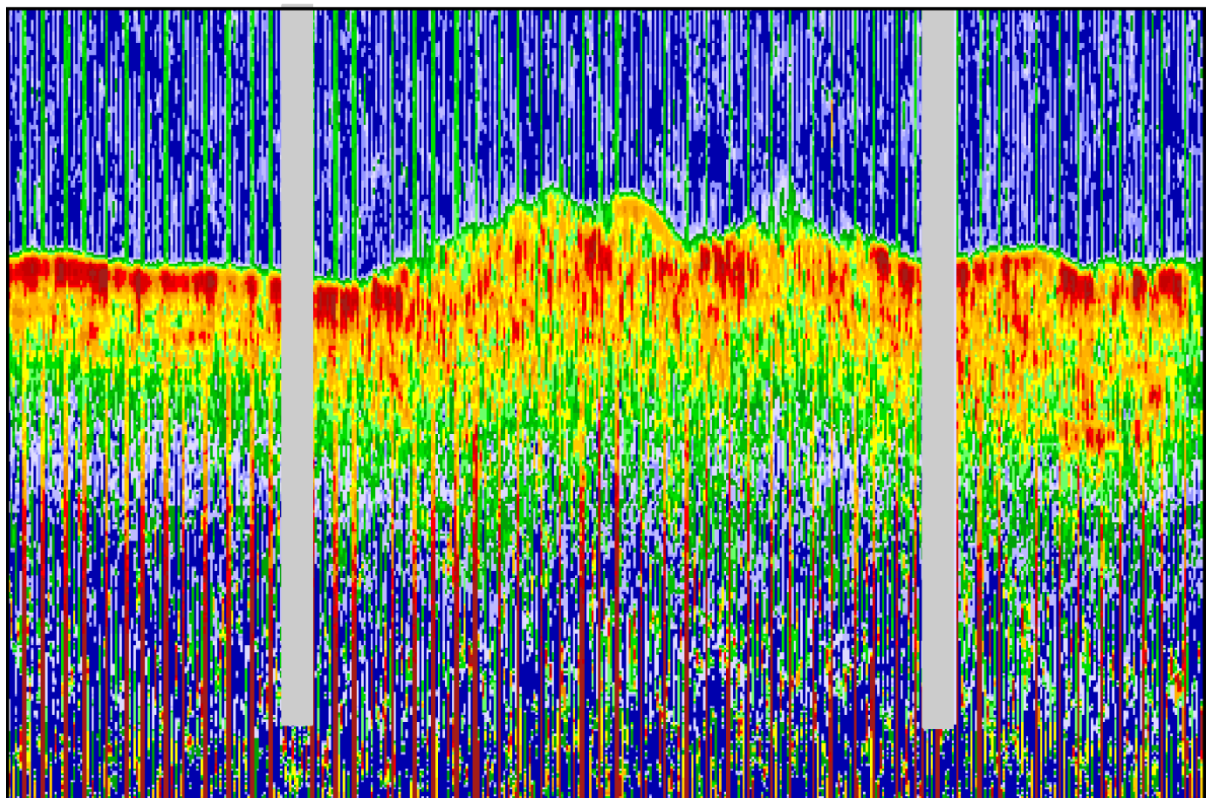
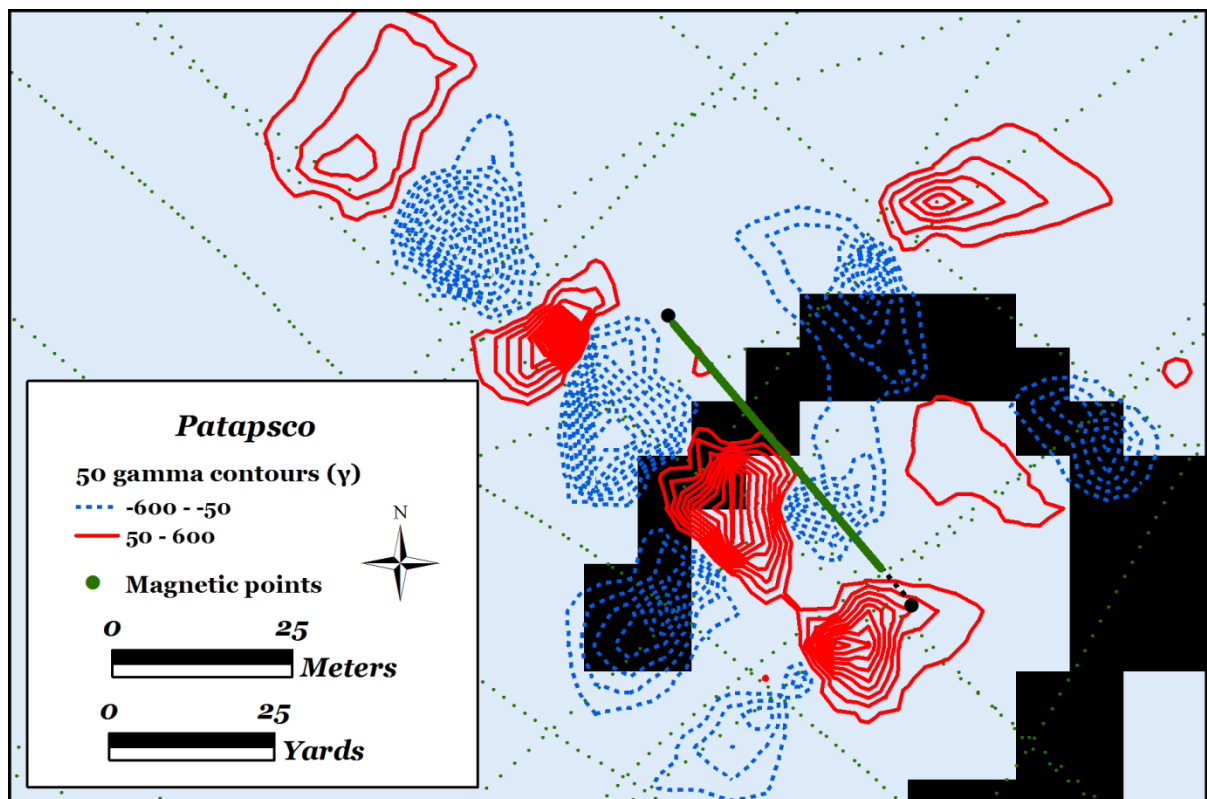


Figure 28: Top—Magnetic contours of Patapsco, and sub-bottom profiler lane (dashed line) and reflector extent (solid line); Bottom—Sub-bottom profiler reflector (NOAA chart 11521, scale 1:80,000, 1999; SCIAA graphic).

magnetic anomalies confirm this orientation, several outlying magnetic features to the NE and SW of the main axis suggest that the site is heavily scattered, due to contemporary salvage and environmental factors. During 1871-1872, Dr. Benjamin Maillefert conducted extensive salvage on the vessel, removing the deck and machinery located beneath, as well as the boiler, turret, pilothouse and sections of armored sponsons. Maillefert noted that salvage on the site, conducted prior to his arrival, had left the wreck in a “distorted condition.” The presence of numerous magnetic anomalies associated with the site suggests that much of the hull iron still remains buried beneath the sediments. Further, the side-scan survey confirms that only a relatively small area of the wreck remains exposed above the harbor sediments (Spirek and Amer 2004:144-148).

As part of the ABPP project, diving was planned on the remains of the ironclad to determine the bow and stern, and other identifiable features of the shipwreck. Three different sets of sonar data were used by the archeologists in preparing for the dive on *Patapsco*, and each provided a slightly different view of the wreck site. MRD first collected acoustic data using a MarineSonic 600 Khz sonar in 2001 as part of our Naval Wreck Survey. Sonograms obtained from this survey showed the shipwreck lying lengthwise on a northwest to southeast axis. The acoustic imagery revealed an integral section of structure, including a recognizable hull outline, along with floors or frames, at the downstream or southeast end of the wreck. A sand or mud ridge appeared to cut athwart the wreck at amidships. From there the wreck seemed to disappear into the bottom sediments going upstream and northeast into the harbor (Figure 29). To augment the previous sonar data and just prior to diving, MRD deployed the Humminbird 997c SI sonar unit and obtained imagery revealing several rows of frames or floors spanning the width of the integral southeast end of the structure. The data also showed the object previously interpreted as a geological feature, along with greater detail of the more nebulous upstream area of the site. During the MRD diving operations on the wreck, Chesapeake Technology, Inc. sent over sonar images of the shipwreck they had collected during a workshop on using their marine surveying software package, SonarWiz.Map. The sonogram provided great detail of the wreck site, including hull structure on the channel side of the wreck, the sand/mud ridge, and more features in the upriver portion of the wreck, including a section of framing. Curiously, they did not show any of the floors or frames in the south end of the wreck. Each of the sonograms assisted in planning the investigation of the site, as well as during diving operations. Extant dimensions of the wreck measure approximately 66 m (216 ft) in length and 15 m (49.2 ft) in width, and were obtained from the acoustic images. The sub-bottom profiler was utilized to determine sediment overburden at the stern section of the wreck, but acted more as an echo sounder and revealed a depth profile of the site (See Figure 28).

Besides relying on the sonograms to plan the dives, architectural drawings of the monitor *Passaic* collected by MRD in the mid-1970s in anticipation of archeological work on *Patapsco* and *Weehawken* were consulted. This collection was augmented with additional *Passaic* plans, dating from the Civil War and from the 1890s during a refit of the vessel, obtained on a research trip to the National Archives II in support of this grant. The drawings proved invaluable in interpreting the extant structure of the ironclad

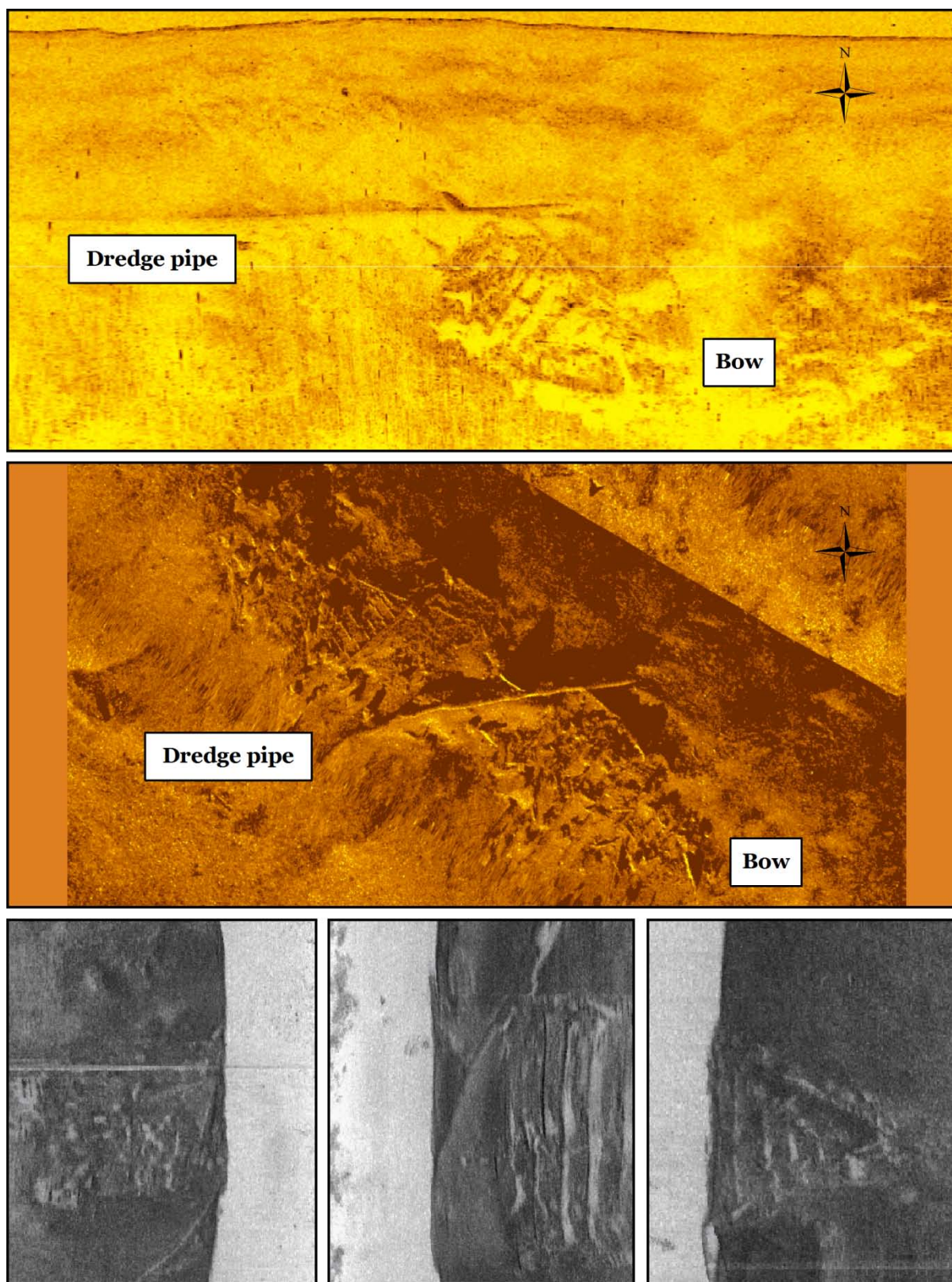


Figure 29: Patapsco wreckage dimensions: 66 m (216 ft) in length and 15 m (49 ft) in width. Top—Sonogram of wreck in 2001; Middle—CTI sonogram of wreck (courtesy CTI); Bottom—(L to R) Stern area; Amidships forward; Bow (SCIAA graphic).

From 13-17 April 2009, archeologists and volunteers conducted reconnaissance dives to meet our objective of better understanding the remaining structure of the ironclad. In an effort to obtain better water clarity, dives were scheduled in the early spring when the cool waters would limit algae growth and to start at slack low tide and continue through the flood tide as it brought in clearer seawater. Visibility during this time frame ranged from several inches with lights at the beginning to several feet by the end of diving operations. While the current was swift at the surface and in the water column, once inside the wreck area it became negligible. Depth of water ranged depending on the tide from 8.5-9.7 m (28-32 ft).

Initial dives quickly ascertained that the structure lying across the wreck was not a sand/mud ridge, but rather a 27 m (29.5 yd) section of dredge pipe. Besides the dredge pipe, derelict crab traps littered the wreck inside and out. While problematical from a cultural resource manager viewpoint in regards to site integrity, the dredge pipe did provide invaluable service in helping orient oneself around the wreck. After locating the downstream, or south, end of the wreck, the archeologists created a “highway” using polypropylene line connecting that point to the channel, or east, end of the dredge pipe outside of the wreck. Attached to the end of the dredge pipe, the line then went approximately 15 m (16.4 yd) along the pipe to the interior of the wreck, and then headed north into the debris field to find the frame structure shown in the Chesapeake sonar image. Next a line from the south end to the midpoint of the wreck at the dredge pipe was situated to provide a direct line from the bow to amidships. The establishment of the highway facilitated the systematic investigation of the shipwreck by abetting movement on the hull.

Examination of the wreck provided a great deal of information on the remaining fabric of the ironclad. The forward most area, or southeast end, is the bow of the wreck, and has a section of hull protruding approximately a meter (3 ft) from the bottom along the port side. This area of the hull was the windlass room which apparently was salvaged. Moving aft from this point, several 15-inch cannonballs were found slightly exposed in the sediments. The beams revealed in our sonograms, especially in the Humminbird images, in this area of the wreck are the remains of the berth deck. They are comprised of iron beams 1.3 cm (1/2 in) thick and 1.2 m (48 in) high. These would have originally supported the wooden flooring for the berth deck. Moving through this area was like trying to do underwater hurdling—but rather than jumping, cautiously climbing over one beam and landing in the cavity between two of them, and then proceeding this way until reaching the dredge pipe. Bottom sediment and disarticulated iron structure filled in the cavities here and there and covered the hold deck below the berth deck. Along the southwestern edge of this area was an exposed pipe, which was interpreted as a ventilation tube based on the plans. Along the northeastern periphery of this area was a pile of disarticulated iron components that raised a couple of meters (6 ft) or so into the water column. Based on the ship’s plan, the dredge pipe spans the area where the machinery to turn the turret was located. Where the dredge pipe pierces the port side of the hull, there is a substantial section of hull that curves down into the sediments. Just aft of this area, a large, twisted piece of metal plating protruded about 2 m (6 ft) in the water column. This might be related to a portion of the turret compartment bulkhead. From this point on, the archeologists encountered various disarticulated iron components, mostly small in nature. MRD did identify the framing component detected in the Chesapeake Technology sonogram and while it showed fairly clearly in the sonar record; underwater the

object did not look or feel as revealed by the sonar. This area of the wreck is where a coal bunker was located, so this piece may relate to the bulkhead fabric. Time limited further investigation of the wreck beyond this point to determine if the propeller or any integral stern structure existed.

As mentioned above, the wreck lies with its bow facing out to sea while the stern points in to the harbor. This corresponds with the last actions of the ironclad as it floated stern-first to Charleston on the flood tide and then reaching the Confederate obstructions steamed back towards Cummings Point while clearing torpedoes. Upon striking the torpedo, the ironclad sank rapidly to the bottom with no turning or twisting motion. The identification of the berth deck confirms that the south end is the bow of *Patapsco*, and the area beyond the dredge pipe as the stern, emptied of the machinery and boilers which were salvaged in the 1870s. From a profile view, there are portions of the hull plating that extend above the berth deck, primarily along the port side, and it is estimated that approximately 1.6-1.9 m (5-6 ft) from the keel to the extant hull plating of the wreck exists in the forward area of the ironclad. Direct observations in the stern area of the wreck was limited, but based on the plans, it is estimated that approximately 0.3-0.6 m (1-2 ft) of depth exists from the keel to extant hull, although in some areas there are sections of the port hull plating extending beyond the bottom. Salvage operations by Benjamin Maillefert were thorough in recovering the main iron components of the wreck—turret, boilers, machinery, armor belt, and hull decks and plates, leaving little behind. Besides the remaining ship's structure, a couple of 15-inch cannonballs, no personal artifacts were observed in the wreckage. Despite the comprehensive nature of the salvage operations, the remains of *Patapsco* offer a rare glimpse at the main offensive weapon used by the Union navy to enforce the blockade and to challenge the Confederate gauntlet at Charleston Harbor.

Morris Island Batteries

MRD investigated the submerged shoreline of Morris Island using the georeferenced 1865 nautical chart to plan the survey areas. In this section of the battlefield, the Union Navy assisted the Army by bombarding Battery Wagner prior to several Union assaults, and provided covering fire while sappers worked to take Battery Wagner. The Union takeover of the island permitted greater enforcement of the blockade by allowing the monitors to maintain an advanced station off Cummings Point in the Main Ship Channel and a place from which to launch attacks on Fort Sumter and the Sullivan's Island batteries. MRD specifically intended to locate the remains of Battery Wagner, the Confederate stronghold on Morris Island, and several works related to the Union siege of the Confederate battery: Fort Shaw, an Union fort, along with two components of the sapping parallels—the wire entanglements and the Surf Battery. All of these sites were presumed submerged due to the severe erosion of the island. A terrestrial site, the Union Marsh Battery, or Swamp Angel, constructed to bombard Charleston, was also investigated, located in the marsh behind Morris Island.

Battery Wagner

Based on the near continual bombardment from July to September 1863 by Federal land batteries and naval vessels directed at Battery Wagner, MRD researchers desired to ascertain whether the location of the Confederate stronghold could be identified through magnetometry. The weight of iron shells and shot thrown at the fort was tremendous. The archeological manifestation of this bombardment would be comprised of numerous whole and fragments of shells and shots. The first Federal officer to view Battery Wagner's interior reported "The sand and sandbags on the parapets and bomb-proofs were displaced and scattered in every conceivable direction, and intermixed with broken shells and solid shot" (*New York Times* 20 September 1863). Another Federal officer estimated that the battery "...had been struck by sixty-one net tons of metal..." (Gillmore 1888:65). Thus, the MRD researchers hoped to identify the location of Battery Wagner by the spatial intensity of various sized magnetic anomalies. This same methodology was used at the 7 April 1863 ironclad battleground. Compounding the difficulty in locating the battery was the construction of two rock jetties at the entrance of Charleston. The navigation project was begun in 1878 and completed in 1896. One jetty was started at Sullivan's Island and the other on Morris Island. Both extended into the Atlantic Ocean. The south jetty was placed at the approximate location of Battery Wagner.

Archeological Investigations

The georeferenced 1865 nautical chart was used to provide a starting point for determining the location of Battery Wagner in the modern period. The overlay revealed that a large portion of the eastern side of the battery presumably lies underwater and just south of the jetty. To account for errors in the georeferenced map, two survey blocks were planned: Battery Wagner-South and Battery Wagner-North indicating their location in relationship to the jetty. Another set of data prepared by a private archeological firm, TRC, was consulted that showed Battery Wagner in roughly the same location that MRD had posited (TRC 2006:34).

Battery Wagner-South survey area

On 10 March 2009, MRD surveyed this area first as the georeferenced chart indicated Battery Wagner lay on the southern side of the jetty (Figure 30). The survey block measured 795 m (869 yd) in length and 70 m (76 yd) in width. Lanes were spaced approximately 20 m (21.8 yd) apart with a survey speed of 4-5 knots. Both the magnetometer and side-scan sonar were deployed. Depth of water ranged from 0.6-3.0 m (2-10 ft) as the survey vessel rode the rising tide to cover more beach. There were numerous magnetic anomalies detected in the survey area ranging from 387 gammas to several gammas. There were no discernible acoustic images in the survey area, and the magnetic anomalies were presumed buried.

Based on the position of the georeferenced Battery Wagner, the area encompassed in this part of the survey block was the sea face of the battery which bore the brunt of the monitors' 15-inch and 11-inch guns, and other naval guns. Several isolated magnetic

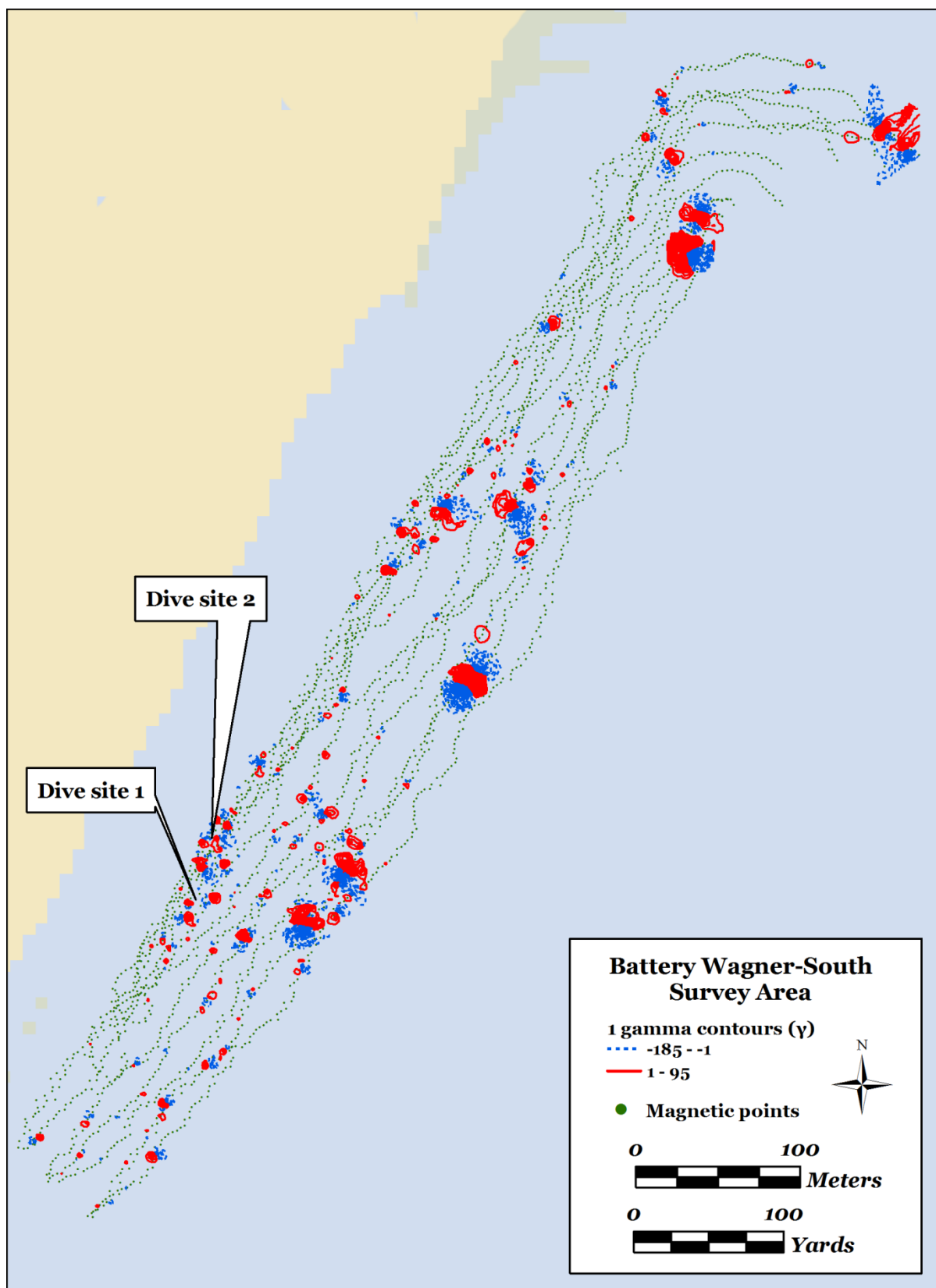


Figure 30: Magnetic contours of Battery Wagner-South survey area (NOAA chart 11521, scale 1:80,000, 1999; SCIAA graphic).

anomalies were detected in this area. These anomalies included the largest magnetic anomaly of 387 gammas in the entire survey area and the others ranged from 71 gammas to several gammas. The isolated nature of the anomalies within the confines of the georeferenced location of the battery did not match the anticipated magnetic clustering of anomalies.

There are two clusters, however, having a spatial intensity of magnetic anomalies south of the georeferenced position of Battery Wagner. Approximately 176 m (192 yd) south of the southern limits of the proposed Battery Wagner is BW-Cluster 1, and 430 m (470 yd) further south is BW-Cluster 2. The magnetic anomalies in BW-Cluster 1 range in amplitude from 77.2 gammas to several gammas. Of the two, BW-Cluster 2 has the greater number of magnetic anomalies ranging in size from 128 gammas to several gammas, with the majority ranging in the 10-20 gamma range.

Battery Wagner-North survey area

On 25 March 2009, MRD surveyed this secondary area in case Battery Wagner lay on the northern side of the jetty (Figure 31). The survey block extended from the jetty to Cummings Point in an attempt to locate Battery Gregg on the point of the island. The survey block measured 1,120 m (1,224 yd) in length and 260 m (284 yd) in width. Lanes were spaced approximately 10 m (10.9 yd) apart with a survey speed of 4-5 knots. Both the magnetometer and side-scan sonar were deployed. Depth of water ranged from 0.6-3.0 m (2-10 ft) as the survey vessel rode the rising tide to cover more beach. There were numerous magnetic anomalies detected in the survey area ranging from 378.7 gammas to several gammas. There were some acoustic images associated with the magnetic anomalies.

Analysis of the magnetic data revealed a spatial intensity throughout the survey block that extended from the jetties to the northern limit of the survey block. The vast majority of the anomalies ranged in the 10-20 gamma range. There was one area with a greater density of magnetic anomalies approximately 335 m (366 yd) from the northern side of the georeferenced location of Battery Wagner. The anomalies in this area contained the largest magnetic anomaly of 387.7 gammas, with the majority of the anomalies ranging in amplitude of 20-60 gammas, with a couple in the 100-plus range. MRD returned on 9 March 2010 and surveyed the BW-Cluster 3 with the magnetometer and side-scan sonar in an attempt to further refine the magnetic data. There were no cultural sonar images generated in this phase and the magnetic anomalies were presumed buried.

Diving Operations

On 20 April 2010, MRD archeologists and volunteers dove in the Battery Wagner South area in an effort to find the sources of two anomaly clusters within BW-Cluster 2. The targets had an amplitude range of 12-27 gammas, indicative of small ferro-magnetic objects, perhaps shell and shot fragments associated with the bombardment of Battery Wagner and vicinity. A sonar search of the area detected no obvious acoustic image as the magnetic sources of the targets. At the time of the dive water depth was 1.8 m (6 ft) and the bottom

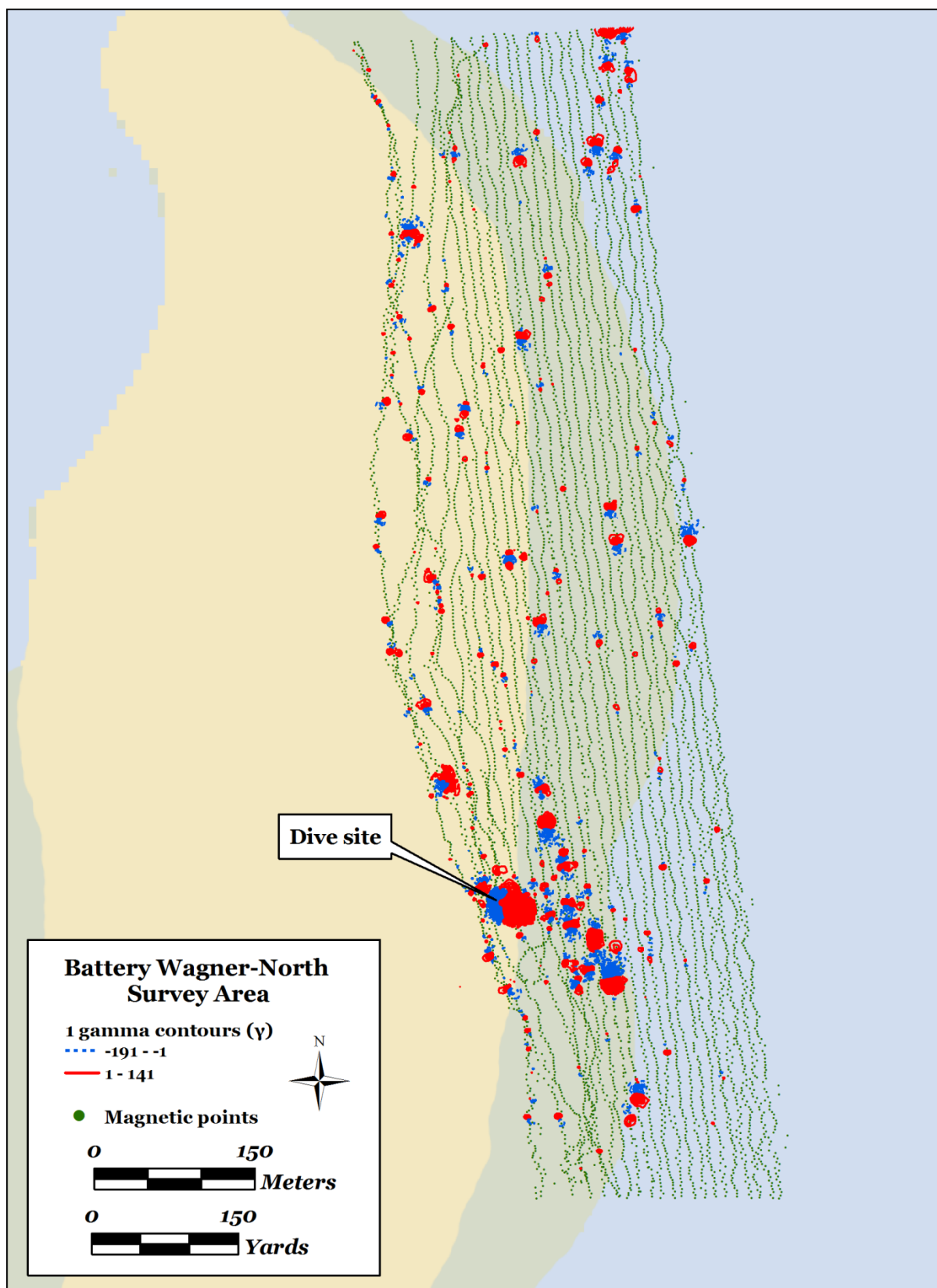


Figure 31: Magnetic contours of Battery Wagner-North survey area (NOAA chart 11521, scale 1:80,000, 1999; SCIAA graphic).

consisted of a smooth blend of sand and fine muds. Employing a metal detector, the dive team circled out to a 15.2 m (50 ft) radius and covered a 733 sq m (7,890 sq ft) area in their effort to locate the metallic objects. No objects were detected in the search and apparently were buried beyond the detection range of the metal detector, approximately one meter (3 ft). Another locus of magnetic anomalies was chosen and employing the same methods once again found the targets buried beyond the detection range of the metal detector.

On 21 April 2010, MRD archeologists and volunteers dove in the Battery Wagner-North area in an effort to find the sources of the large anomaly in BW-Cluster 3. A sonar search of the target area revealed a cylindrical object protruding above the ocean bottom. At the time of the dive the water depth was 2.4 m (8 ft) and the bottom consisted of a smooth blend of sand and fine muds. Visibility was several inches. Divers immediately made contact with the metal object. The cylindrical object measured approximately 1.5 m (5 ft) long and 0.9 m (3 ft) in diameter, and stood off the bottom about 0.6 m (2 ft). Both ends of the object were flat, and had a few holes at the side and end interfaces. No definite function of the object was ascertained during the brief inspection, but it appeared to be modern in nature.

Interpreting the results of the two survey areas has raised more uncertainty instead of certainty regarding the location of Battery Wagner (Figure 32). For example, the three clusters of anomalies appear too far away from the georeferenced location of the battery. The results of the magnetics in the north survey area, however, indicate the presence of numerous small to medium sized anomalies. This magnetic pattern seems to indicate a quantity of ferro-magnetic materials that could correspond to burst shot and shell, as well as whole missiles. The area from Battery Wagner to Battery Gregg withstood severe pounding by Union land batteries and naval vessels until the Confederate abandonment of Morris Island in September 1863. In the south survey area, the magnetic anomalies appear more concentrated together, although at the southern extremity of the block the number of anomalies appears to increase.

Regarding some of the large anomalies, both within and without the clustered areas, experience has shown that multiple shells in close proximity to each other can appear as a large dipole magnetic anomaly. At the Mars Bluff Navy Yard on the Great Pee Dee River a number of 7-inch and 6.4 inch Brooke shells were thrown into the river as the CS navy abandoned the facility due to Union Brigadier General William T. Sherman's advancing army in 1865. Magnetometer survey by the MRD of the riverfront adjacent to the navy yard revealed a large magnetic anomaly that was subsequently identified as several shells lying close to each other and buried beneath the river bottom. As mentioned above the sea front of Battery Wagner withstood severe pounding by the Union navy and the proximity of shells that failed to explode, as well as fragments, would likely appear as high concentrations of metal. BW-Cluster 2 seems to exhibit this pattern, but appears too far away to represent the battery. Other explanations for these two southern clusters are that they are related to the Union efforts to take the Confederate stronghold by building a series of batteries and saps. Alternately, perhaps they are indicative of remnants of pre- and post-development of the island as a quarantine and lighthouse station. In any event, additional work is necessary to

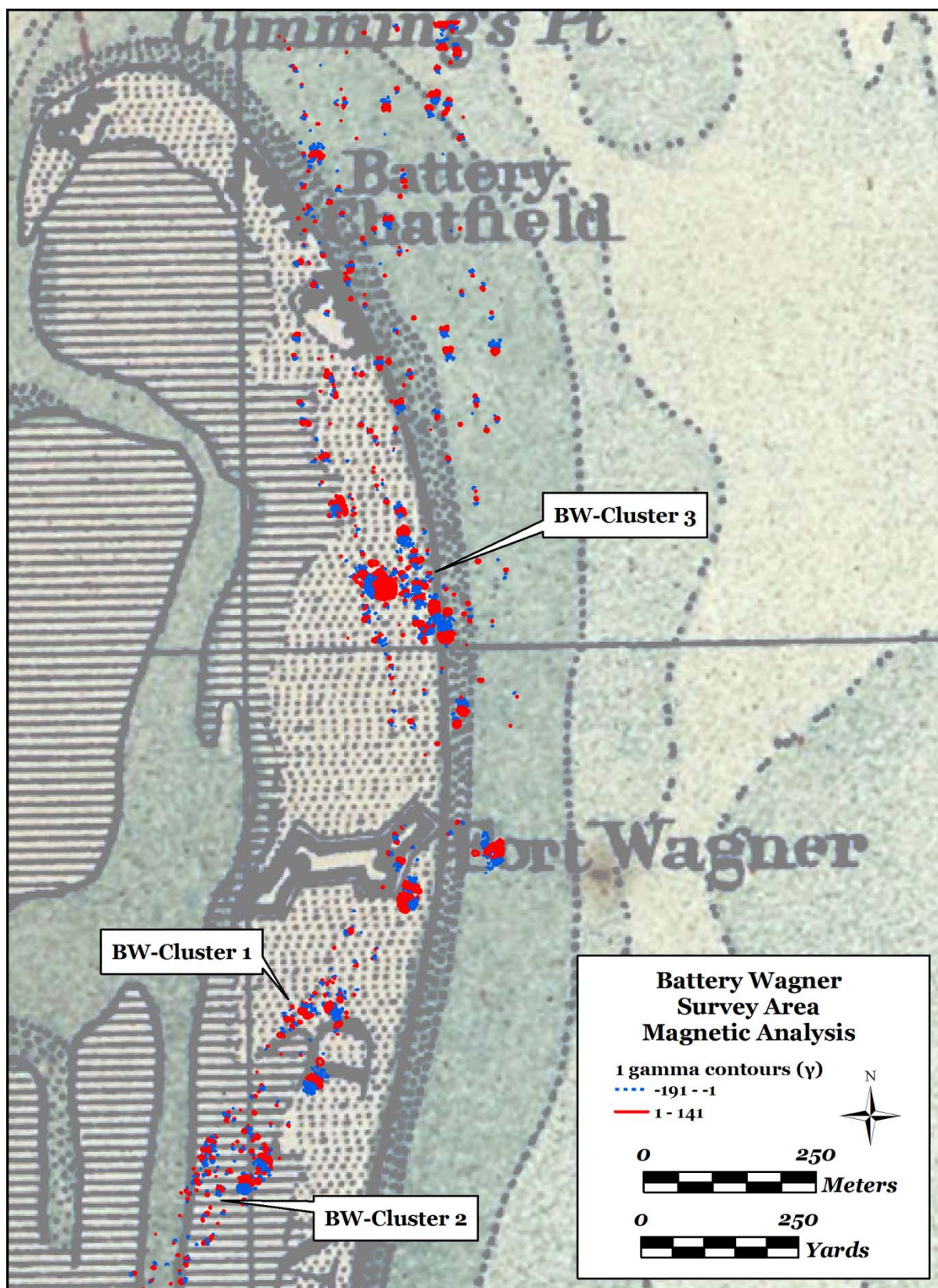


Figure 32: Magnetic analysis of Battery Wagner survey areas (US Coast Survey 1865; SCIAA graphic).

clarify the sources of these anomalies to determine their relationship, if any, to the Union assault on Battery Wagner.

Fort Shaw

Fort Shaw was a Union fortification located on the southern end of Morris Island. The fort was built, or strengthened, from a Confederate outer work, shortly after the Union's successful assault on the south end of Morris Island on 10 July 1863. The fort was officially named Fort Shaw in October 1863 to honor the fallen Colonel Robert Shaw, commander of the 54th Massachusetts, composed of African-American soldiers, killed during the failed 18 July 1863 Federal assault on Battery Wagner (Wise 1994:210; *ORA*, ser. 1, vol. 53:94). Fort Shaw was part of the Union defensive arrangements to prevent against an attack from Lighthouse Inlet, and specifically to hold the south end of the island against attack in any direction. Area around the fort served as a camp for the reserve troops sent to reinforce the northern island batteries (*ORA*, ser. 1, vol. 35 (part 2):641). The fort according to the map was Y-shaped with the base pointed towards Folly Island and the arms towards the north and had two gates. The slopes of the fortification were composed of sand with a stockade perimeter. The fort's armament in early April 1864 consisted of two 10-inch siege mortars and two 8-inch sea coast howitzers and had a garrison of two officers and 159 men. The battery was increased to five 8-inch siege howitzers and two field pieces in June. The fort also stored 200,000 rounds of small-arm ammunition (*ORA*, ser. 1, vol. 35 (part 1):498; vol. 35 (part 2):42-43; 117). On 7 November 1864, Fort Shaw was reported in good condition but still needed additional work to the palisade (*ORA*, ser. 1, vol. 35 (part 1):82).

Archeological Investigations

On 11 March 2009, MRD surveyed the georeferenced area of Fort Shaw in an attempt to locate any ferro-magnetic materials associated with the fortification (Figure 33). The survey block measured 750 m (820 yd) in length and 310 m (339 yd) in width. Lanes were spaced approximately 15 m (16.4 yd) apart with a survey speed of 4-5 knots. Both the magnetometer and side-scan sonar were deployed. Depth of water ranged from 1.8-3.6 m (6-12 ft). In the middle of the survey area, and at the northeastern edge of the georeferenced position of Fort Shaw, was a scientific assembly of buoys and nets that obstructed the survey vessel. A number of isolated magnetic anomalies were detected in the survey block. These ranged from 861 gammas to several gammas in amplitude. At the northwest side of the survey block was FS-1 a multi-component magnetic anomaly that had an amplitude of 143.6 gammas and a duration of 10 seconds. The anomaly disturbed a 1,488 sq m (1,780 sq yd) area and affected three lanes. This anomaly is interesting as a target having potential archeological and historical significance. There was a scatter of smaller magnetic anomalies occurring towards the east from this anomaly. Within the confines of the georeferenced location of the fort are several magnetic anomalies ranging in amplitude of 4-21 gammas. There were no discernible acoustic images and the sources of the magnetic anomalies are most likely buried. The magnetic anomalies do not appear to indicate the presence the fort, although perhaps the isolated anomalies may have some connection to the Union fort or activities in this area of Morris Island. Project priorities precluded diving on magnetic

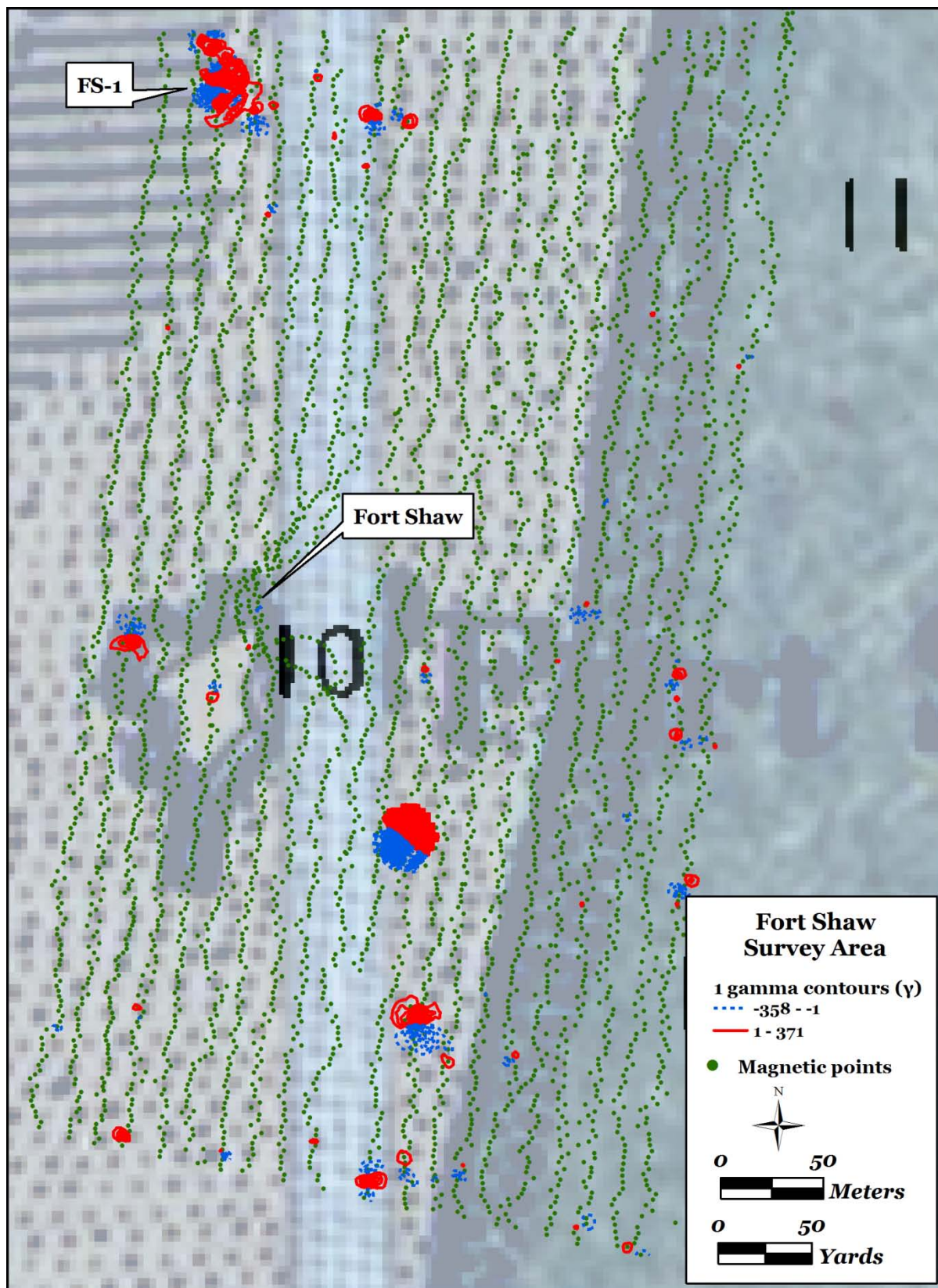


Figure 33: Magnetic contours of Fort Shaw survey area (US Coastal Survey 1865; NOAA chart 11523, scale 1:20,000, 1999; SCIAA graphic).

anomaly FS-1 which awaits future visual inspection to determine its archeological significance or relevance to the battlefield.

Wire Entanglement and Surf Battery

On 23 July 1863 during the siege of Battery Wagner, Union engineers constructed 60 yards of wire entanglements spanning across Morris Island from low water on the east to the marsh on the west in front of the main defensive line. The wire entanglement was fashioned by setting stakes 3.5 feet long and 2 feet into the ground every 7 feet in three lines in a quincunx arrangement. A foot below the top of each stake, wire was securely wrapped and then extended to the next one (*ORA*, ser. 1, vol. 28 (part 1):274-275, 304). The wire entanglement was designed as an obstacle across the beach to prevent an enemy advance at low tide, and to trip attackers up in the dark. The obstruction was difficult to maintain as several days later, on 29 July, portions were washed away by the spring tides and partially destroyed by Confederate obstructions that had floated out of Charleston Harbor (*ORA*, ser. 1, vol. 28:278; Davis 1873:103).

A seaward defensive barricade, constructed from 23-29 July 1863 on the right side of the second parallel, stretched across the beach from high to low water. The structure terminated at a strong crib work, called the Surf Battery, on which three Requa batteries and two field howitzers were placed to sweep the beach. The work could only be completed during low tide which occurred during the night at this time. Built on piles and cribbing, this defensive structure proved the most durable of the field works exposed to the ocean. Located at the extreme east end in the sea, the Surf Battery was built on a crib work 32 feet by 36 feet of heavy logs fastened together by ropes. The crib work was constructed of logs 6-12 inches in diameter, and the piles were 7 inches in diameter. They were worked about 3.5 feet into the sand by hand, and then lashed together by rope. A platform of heavy planks was spiked to the cribbing and just above the highest tides. A sand bag parapet 11.5 feet high and 11 feet wide with a slight slope encompassed the platform. The Surf Battery had three embrasures lined with boiler iron from the wrecked blockade runner *Ruby*. They were arranged to flank the second parallel and to sweep the beach in front. On 18 August, a very high tide compounded by a northeast storm demolished one-third of the sandbag parapet and forced the removal of the two guns. The culmination of the Union siege operations at Battery Wagner was to launch a third attack on the fortification planned for 7 September 1863 which signal was to be hoisted up on the Surf Battery (*ORA*, ser. 1, vol. 28 (part 1):18, 209, 285, 288, 308).

Archeological Investigations

To prepare for the survey, MRD georeferenced *Map Showing Siege Operations against Sumter & Wagner Morris Island, SC Between July 13 & September 7, 1863* to the georeferenced 1865 nautical chart. Positions of the Wire Entanglement and Surf Battery were traced and placed on the modern nautical chart to prepare a survey area. While detecting the Surf Battery was highly unlikely with the magnetometer due to the use of a few fasteners, the wire entanglement seemed more plausible. If any of the wire associated with

the structure remained, the magnetic signature was presumed to resemble a concentration of complex anomalies, perhaps in a linear arrangement similar to the magnetic signature of a cable (See Hog Island frame torpedoes and boom section for an example). As for the Surf Battery, the side-scan sonar was the primary instrument to locate this battlefield feature and image any unusual wooden features on the bottom.

On 11 March 2009, MRD undertook a survey for the two components intending to find any related ferro-magnetic materials associated with these Federal structures (Figure 34). The survey block measured 425 m (464 yd) in length and 145 m (158 yd) in width. Lanes were spaced approximately 20 m (21.8 yd) apart with a survey speed of 4-5 knots. Both the magnetometer and side-scan sonar were deployed. Depth of water ranged from 1.8-3.0 m (6-10 ft). Several small magnetic anomalies were detected ranging in amplitude from 19.5 gammas to several gammas. There is a concentration of anomalies in the upper north central area in the survey block, in and around the georeferenced area of the wire entanglement. No discernible acoustic images were detected and the sources of the magnetic anomalies are presumed buried. There were no anomalies within the immediate vicinity of the Surf Battery. The isolated nature of the anomalies at the wire entanglement does not correspond to the anticipated magnetic pattern of a large amount of cable, but rather of individual ferro-magnetic materials. While no clear indication of the either battlefield component was detected, perhaps additional survey in the future may uncover their location if evidence yet exists.

Marsh Battery (Swamp Angel)

On 16 July 1863, Union engineers received orders to find a suitable place to construct a battery in the marsh and within effective range of the city and the shipping at the wharves. The site chosen was located approximately between Morris and James Island and 7,000 yards from the lower end of Charleston. The new battery was known officially as the Marsh Battery and by the soldiers as the “Swamp Angel.” Situated on a creek, two floating booms on either side of the battery protected the battery from boat attack. The battery was constructed of sandbags to form a wall over a grillage of unfinished timbers set cross wise to each other and resting on the marsh. At the rear was an opening for the gun platform. Piles were driven into the marsh and between the piles and grillage were placed layers of mud, marsh grass, canvas, and sand to create a sub-floor for the plank floor for the gun platform to rest on. Armament consisted of an 8-inch, designated by the Army as a 200-pounder, Parrott rifle. Begun on 2 August the battery was ready for use by 21 August (*ORA*, ser. 1, vol. 28 (part 1):19-20, 230-236; Davis 1878:100-101). On several occasions in mid-August Confederate pickets visited the worksite when Union workers were not present (*ORA*, ser. 1, vol. 28 (part 1):550-551). From its discovery and onwards the battery received the attention of the Confederate batteries on James Island and endured numerous shellings, the results of which were quickly repaired (*ORA*, ser. 1, vol. 28 (part 1):134).

The bombardment of Charleston began shortly after midnight on 21 August and continued on the next night until the Parrott rifle burst on the 36th round. Parrott shells weighing 150 pounds were used, including some incendiary shells that contained pieces of port-fire, along with regular powder (*ORA*, ser. 1, vol. 28 (part 1):30-31). By 3 September

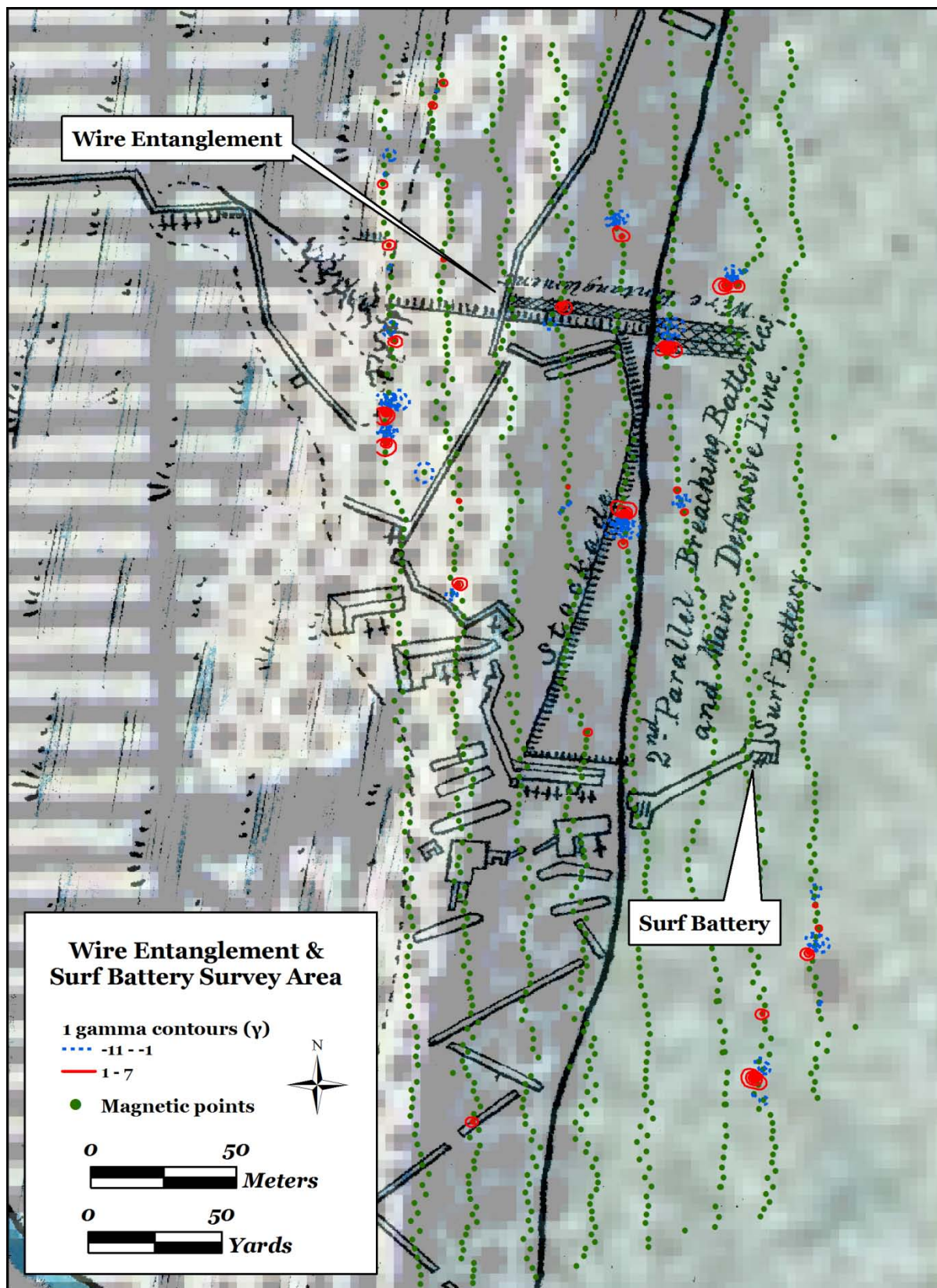


Figure 34: Magnetic contours of Wire Entanglement and Surf Battery survey area (US Coastal Survey 1865; Siege Operations against Fort Wagner 1863; SCIAA graphic).

1863, the burst Parrott was replaced with two sea coast mortars (*ORA*, ser. 1, vol. 28 (part 2):81). In March 1864, Swamp Angel Battery was reported dismantled and two 10-inch mortars removed, and in April workers were removing pieces of the 200-pounder Parrott which had burst in the battery the previous summer (*ORA*, ser. 1, vol. 35 (part 2):43). The battery was later restored and rearmed with a 30-pounder Parrott in August 1864 (*ORA*, ser. 1, vol.35 (part 1):20, 72). General orders for the battery in late 1864 called for night time firing to prevent the discharge of men and supplies from the steamers landing at Fort Sumter (*ORA*, ser. 1, vol.35 (part 2):284). The battery operated until the abandonment of the harbor by the Confederates in early 1865.

Archeological Investigations

On 24 February 2010, MRD conducted a brief examination of the Federal battery known as the “Swamp Angel” or officially as the Marsh Battery located on Bass Creek (Figure 35). Today, a sign placed by the SC Coastal Council denotes the location of the Swamp Angel battery. The site is overgrown by a variety of marsh grasses and small bushes, and rises several feet out of the marsh. The approximate extant dimensions of the Swamp Angel battery are 16.1 m (53 ft) in the E/W direction, and 12.1 m (40 ft) in the N/S direction. The matrix of the battery is fine sand. There is a depression in the middle of the battery. Today, the original and cracked Swamp Angel 8-inch Parrott rifle resides on a pedestal in Cadwalader Park, Trenton, New Jersey (<http://scbattlegroundtrust.org/index.php/properties-protected/marsh-battery-swamp-angel> [19 November 2012]).

Steamer Manigault & Payne’s Wharf

At the mouth of Vincent’s Creek immediately adjacent to the backside of Morris Island Confederate engineers were tasked with building a battery in the marsh. The Vincent’s Creek battery was intended to support the south end of Morris Island and to flank the front of Battery Wagner (*ORA*, ser. 1, vol. 28 (part 1):70, 96). A 26 May 1863 report by the engineer in charge of the construction project noted the battery had been under construction for five weeks and was proceeding slowly due to want of suitable material to build the battery. Progress was also slow as a result of digging up the marsh to float in a hulk to form the bed of the battery (*ORA*, ser. 1, vol. 14 (part 1):959). On 10 July 1863, Union land forces, supported by the navy, successfully captured the south end of Morris Island (*ORN*, ser. 1, vol. 14:718). Despite the loss of the south end of the island, work continued on the battery for the next couple of days. On 12 July, a Union battery spotted the Confederate work party at the site, along with the steamer scow *Gabriel Manigault* and started firing at the vessel. According to reports from a contraband, the first shot disabled the steamer and killed a man, and several other shots went through and finally blew up the boiler. The vessel caught fire on 13 July after repeated shellings (*ORA*, ser. 1, v. 28:371; *The New York Herald* 19 July 1863; *The Charleston Mercury* 14 July 1863).

Following the abandonment of the battery by the Confederates, Union scouts used the wrecked steamer and remains of the battery as a forward observation post to monitor movement in the harbor. On 1 August a report from Fort Sumter mentioned several rockets



Figure 35: Top—Historical image of Swamp Angel battery; Middle—Aerial image of Swamp Angel with detail inset; Bottom—Swamp Angel from creek level (SCIAA photo).

being fired from somewhere in the marsh and soon after cannon fire commenced on the steamer *Chesterfield*. Again on 3 August, the steamer *Sumter* was driven away from Morris Island by Union cannon fire when the steamboat's arrival and departure were signaled by rockets fired from apparently where the steamboat *Manigault* was burned (*ORA*, ser. 1, vol. 28:576-577).

On the night of 4 August, a Confederate expedition of four boats with 30 men under the joint command of an army and navy officer attacked the annoying Union picket post. One component of the expedition landed in the marsh on the west side of the battery, while the other rowed around the battery and came in from the east side. The Confederate forces on land attacked the battery, and the Union scouts took refuge between the unfinished battery and the hull of *Manigault*. Several Confederate soldiers jumped up on the ruined steamer firing down into the Union soldiers. Finding themselves surrounded with the appearance of the other division of the Confederate forces, the Union scouts surrendered. During the affair the Confederates lost one man killed, while the Union scouts suffered one man killed and four wounded. The Confederates captured one officer and nine men. One Union scout boat managed to escape (*ORA*, ser. 1, vol. 28 (part 1):593-595; *ORN*, ser. 1, vol. 14:738-739). The captured and wounded Union officer was Captain Lewis Payne, 100th New York Volunteers, who was a celebrated scout (*The New York Herald* 12 August 1863). Afterwards, the site of the battery and steamer hulk was called Payne's Wharf (although frequently spelled as Paine's). Apparently the Union dislodgement from the area was temporary, as on 12 August a Charleston newspaper article reported on an extraordinary light coming from the marsh near the wrecked steamer *Manigault* (*The Charleston Mercury* 12 August 1863).

In the fall of 1863, Brigadier General Gillmore ordered an assessment to determine Payne's Wharf suitability as an artillery platform (Figure 36). The army engineers found that Payne's Wharf consisted of a floor of heavy planking resting on an uncertain foundation, which was enclosed by a cribwork of heavy square timbers about 4 feet high. One section of the cribwork had been burned down to the flooring. About 12 feet inside of the cribwork was another enclosed space approximately a foot and a half high formed by square timbers. The interior of this space was filled with oyster shells. The wharf had an overall length of 190 feet and breadth of 48 feet. The wharf lay on the left side of the creek and 30 feet from shore. High tides filled the interior of the structure. The engineers determined the exposed location of the battery and the uncertain foundation unsuitable as a gun emplacement (*ORA*, ser. 1, vol. 35 (part 2):236-238).

Throughout the remainder of the siege of Charleston Harbor, Payne's Dock/Wharf fulfilled important logistical purposes for the Union army and navy. On 3 July 1864 it served as the rendezvous point for the launching of a failed Union small boat attack against Fort Johnson on 3 July 1864 (*ORA*, ser. 1, vol. 35 (part 2):96). And in August 1864 it was described as a picket post and forward observation post for reporting the effects of shelling on Fort Sumter (*ORA*, ser. 1, vol. 35 (part 1):72). Navy launches also participated in cooperative picket duties at the dock (*ORA*, ser. 2, vol. 7, *passim*).

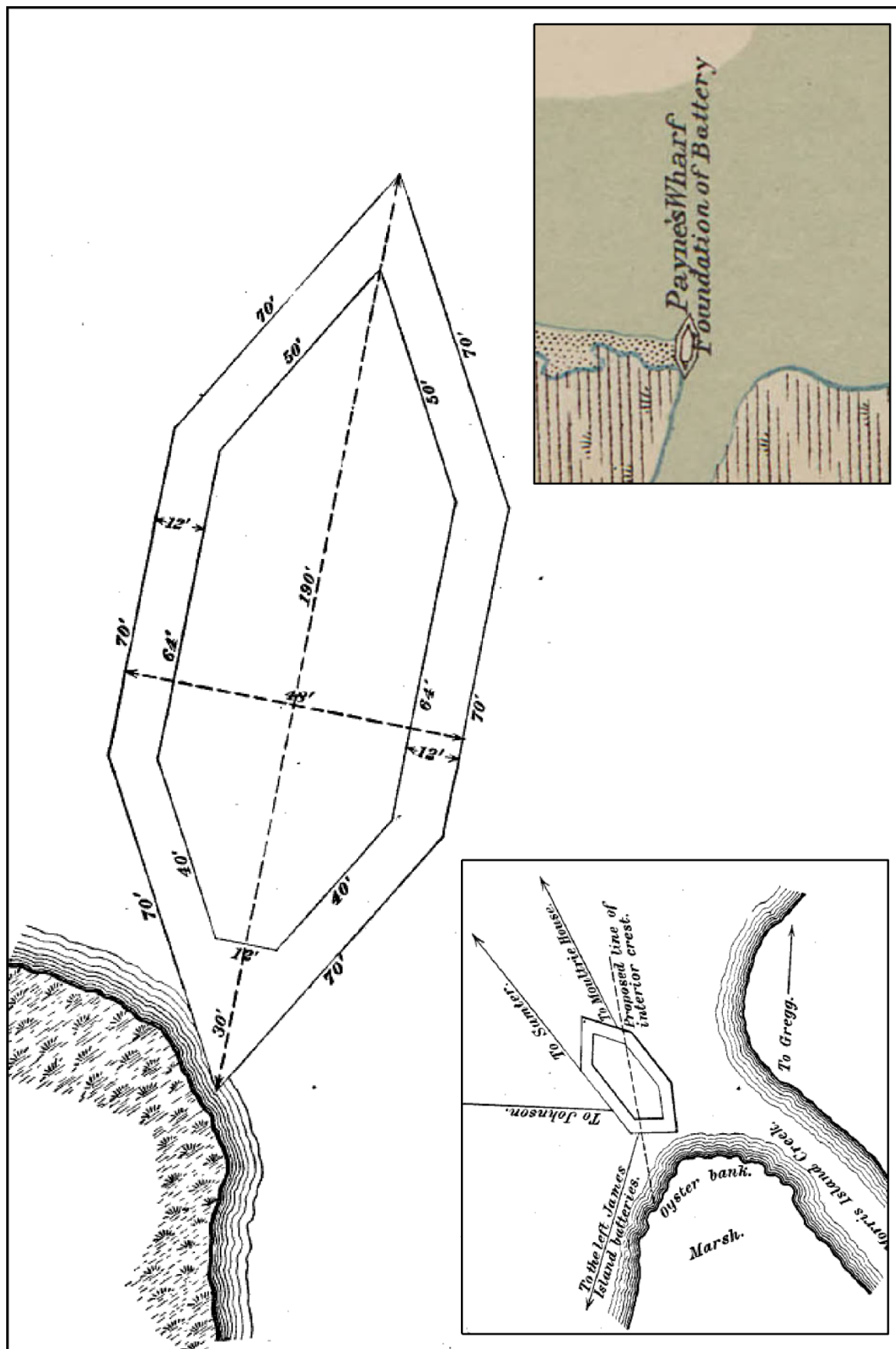


Figure 36: US Army Engineers drawings of Payne's Wharf (ORA, vol. 35:237-238; ORA Atlas:Plate 38).

Archeological Investigations

On 12 March 2009, MRD conducted magnetometer, side-scan sonar, and sub-bottom profiling of the area thought to contain the remains of the Confederate steamer and the remains of Payne's Dock. The survey block at the mouth of Bass Creek measured 445 m (486.6 yd) in length and 200 m (218 yd) in width (Figure 37). Survey lanes were spaced approximately 20 m (21.8 yd) apart with a boat speed between 4-5 knots. Several isolated magnetic anomalies were detected. No acoustic anomalies associated with the magnetic targets were detected. The sub-bottom profiler did not record any reflectors indicating the presence of the wrecked steamer. An anomaly at the extreme west side of the survey block area represents a buoyed crab trap. There was a cluster of several anomalies at the eastern area of the survey block. These anomalies ranged from 307-34 gammas. The cluster of anomalies most likely represents several derelict crab traps and other modern debris. The marsh area on the back side of Morris Island adjacent the east side of the survey block has several large metallic objects strewn about associated with modern dredging operations, perhaps some associated accoutrements account for these magnetic anomalies as well.

During the survey along the marsh line, a slight rise in the marsh, and a change of vegetation from smooth cordgrass (*Spartina alterniflora*) to sea ox-eye (*Borrichia frutescens*) was observed. The electronic data did not detect anything conclusive suggesting the presence of the wreck, but perhaps the small rise in the marsh indicates the final resting place of *Manigault* or the remains of the wharf. The small hammock measured approximately 42.9 m (47 yd) in length and at its widest 18.9 m (20.6 yd) using an aerial photograph. The measurements fall within the general dimensions of the wharf by the Union engineer in 1863. Additional work is needed to confirm this supposition but seems likely with the Confederate efforts to create a battery by adding fill inside a hulk and accounting for any subsequent accretion of the marsh into the small bay may have also covered over the steamer *Manigault*.

Union Blockade

Initially the Union naval blockade straddled the ebb-delta complex in front of the harbor east along the three fathom contour, and extended from Dewees Inlet to the north and Stono Inlet to the south. After the evacuation of Morris Island by Confederate forces in September 1863, the Union navy advanced the blockade line to the north end of the island off Cummings Point. There were two distinct divisions of the blockade: Outer and Inner. The Outer blockade consisted of an assortment of wooden steam and sail vessels stationed at the several channel openings over the bar into Charleston Harbor, namely Lawford, Main Ship, Swash, North, and Maffitt's/Beach Channel, and at the inlets, Stono, Lighthouse, Breach, and Dewees. The Inner blockade comprised the ironclads stationed off Cummings Point, and during the night a small flotilla of launches outfitted with boat howitzers from the Outer blockaders operated as near as possible to Sullivan's Island and as deep into the throat of the harbor as caution dictated. Here the navy enlisted the support of the Union army batteries on Morris Island to assist in the interdiction of the blockade runners. The main objective of each division of the blockade was to prevent the egress and ingress of blockade runners bringing valuable military supplies and private merchandise to the Confederacy and

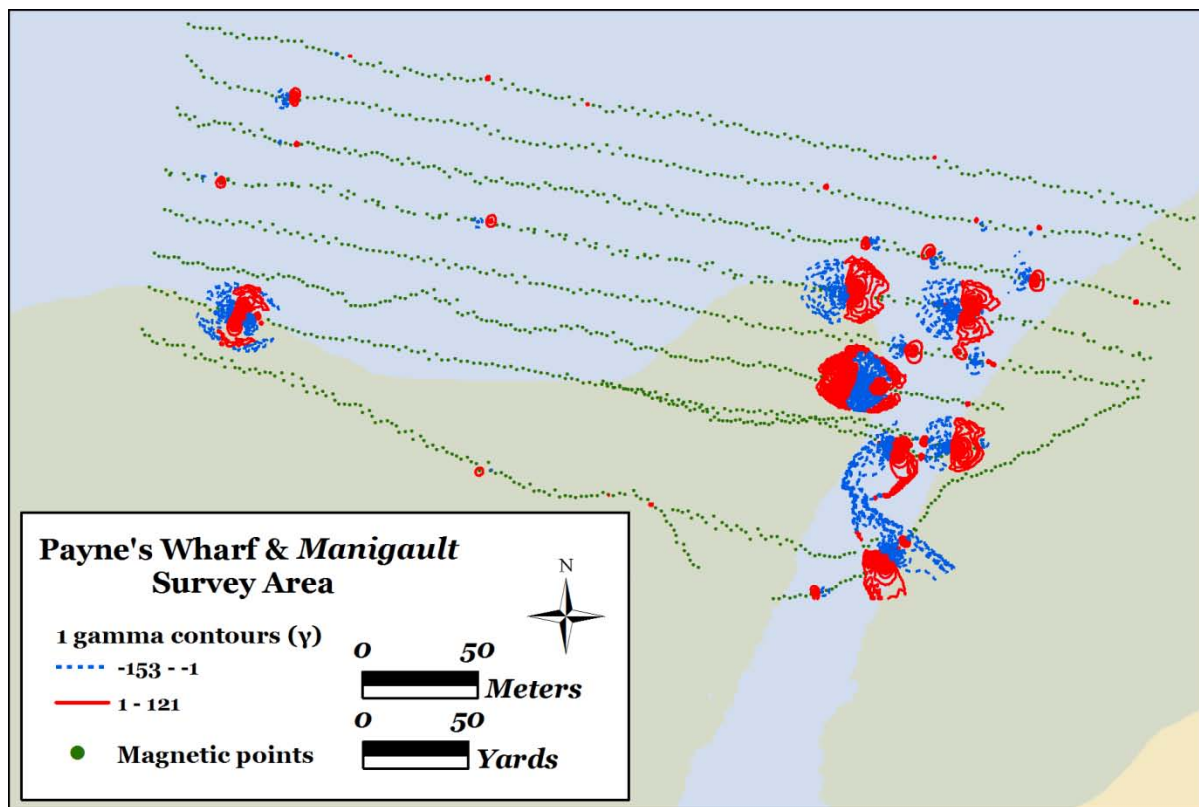


Figure 37: Top—Magnetic contours of Payne's Wharf and Manigault survey area (NOAA chart 11521, scale 1:80,000, 1999; SCIAA graphic); Bottom—Rise in marsh, inset aerial image (SCIAA photo).

departing laden with agricultural products and naval stores to European markets, primarily Great Britain.

The following section describes the archeological components related to each division of the Union blockade (Figure 38). Outer blockade cultural resources include the First and Second Stone Fleets, several blockade runners, and the *Hunley* and *Housatonic* engagement site. Inner blockade archeological resources include the remains of *Weehawken* sunk while anchored, and seven blockade runners that wrecked on the shores of Sullivan's Island at Fort Moultrie and Bowman's Jetty. Each of these sites equally reflects the Union desire to thwart access in and out of the harbor and the Confederate attempts to evade and to break the blockade, especially evidenced at the *Hunley* and *Housatonic* naval engagement site.

Outer Blockade

First and Second Stone Fleets

On two separate occasions and locations, Federal naval forces scuttled 29 ex-whaling and merchant vessels from New England loaded with granite and other types of rocks: 16 vessels in the First Stone Fleet sunk at the bar of the Main Ship Channel, and 13 vessels in the Second Stone Fleet sunk at Maffitt's or Beach Channel. One of the whalers destined for the Second Stone Fleet broke free during a gale and eventually sank some distance to the northward and eastward of Rattlesnake Shoal. The first scuttling took place from 17-21 December 1861 and the second from 20-25 January 1862 (*ORN*, ser. 1, vol. 12:421-423; *ORA*, ser. 1, vol. 6:43-44; *New York Times* 31 January 1862). Shortly after the sinkings, both fleets disintegrated rapidly, with large sections of the wrecks floating up on the nearby beaches dislocated by storms and waves over the next several years. As one soldier of the 54th Massachusetts, an ex-whaleman himself, wrote on 19 September 1863 from Morris Island to a New Bedford newspaper,

We had a heavy gale here...I saw the floor ribs of a good-sized ship high and dry on the beach, drove up by the fury of the waves. She may be a relic of the stone blockade, as I saw a piece of a vessel's knighthead marked "Corea," and I believe there was a ship of that name in the stone fleet (Adams 1992).

From that point on to the present, the general supposition was and is that the stone fleet vessels simply dissolved and disappeared into the sand. As part of the grant to document the battlefield, MRD wanted to determine where the fleets rested and to resolve whether they were buried or not.

In an effort to locate the remains of the First and Second Stone Fleets, MRD consulted historical documents and generated a georeferenced 1858 harbor chart to begin planning the survey. Union accounts provided general descriptions of the work entailed to sink the vessels, but no real concrete location as to where they sank the vessels (*ORN*, ser. 1, vol. 12:410-424; 510-515). Several newspaper reporters present at the scuttling project

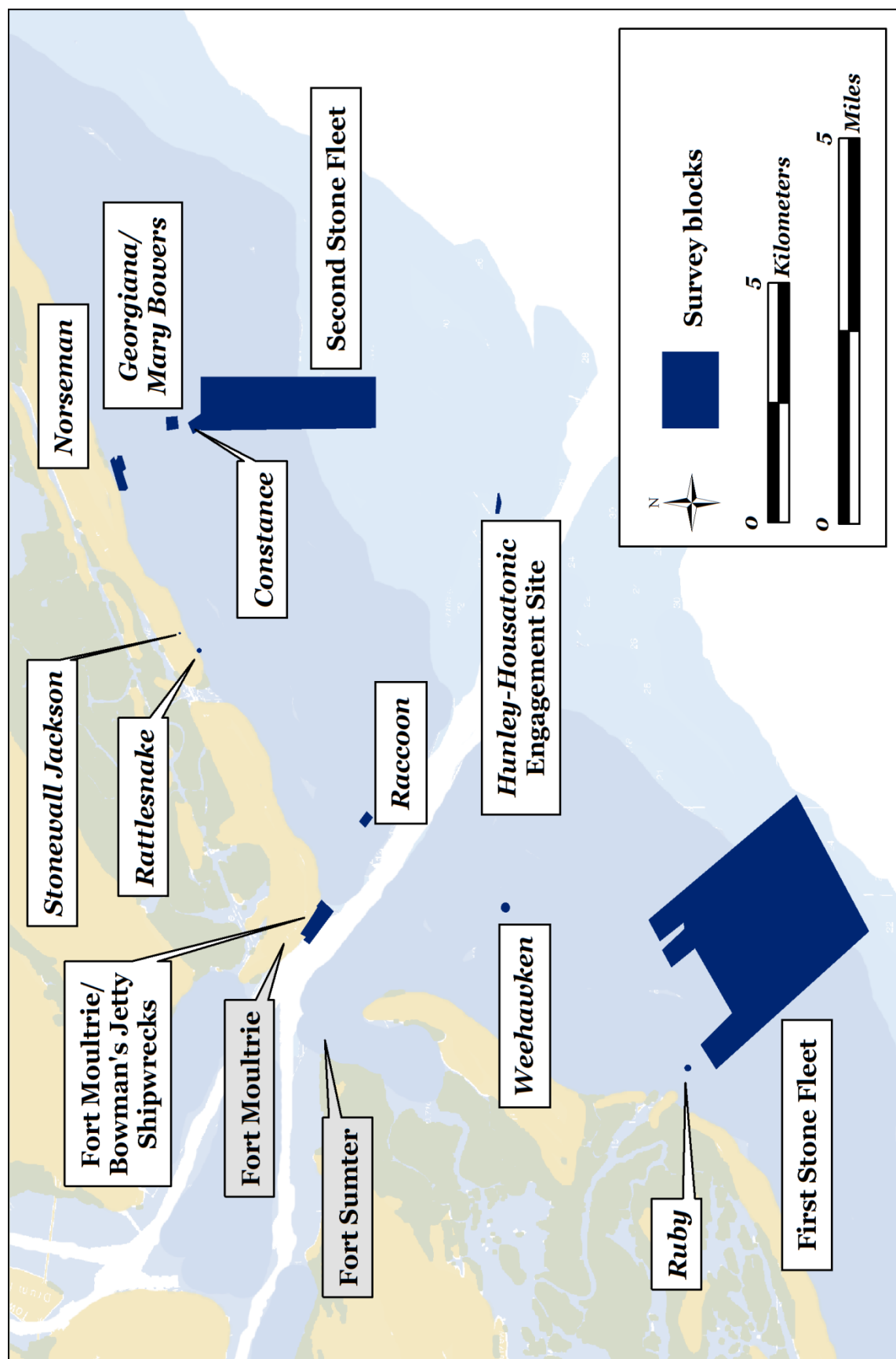


Figure 38: Blockade survey areas (NOAA chart 11521, scale 1:80,000, 2010; SCIAA graphic).

provided a descriptive account of the First Stone Fleet and information about how the vessels were actually lying when sunk at the bar (*Harper's Weekly*, vol. 6, no. 263, 11 January 1861:32; *New York Times* 26 December 1861; Moore 1862:508). The most detailed source of where the stone fleets' were scuttled at the channel entrances comes from Confederate reports. Major Thomas Wagner, CSA, namesake of Battery Wagner, reported the sinking of the vessels from the First Stone Fleet approximately "4 miles south-southeast of Fort Sumter and 3 miles east-southeast of the light on Morris Island." Wagner reported the second sinking of vessels approximately "...six miles and a half east-northeast of Fort Sumter" (*ORA*, ser. 1, vol. 6:43-44). Research at the National Archives revealed no additional written accounts of the efforts to sink the vessels, nor any maps to pinpoint their locations.

To create the survey areas to locate the stone fleets, the georeferenced 1858 harbor chart was overlaid the modern nautical charts. Additionally, the measurements observed by Major Wagner were generated in ArcGIS to create a search area for the stone fleets. Using his measurements and directions revealed that the First Stone Fleet location was nowhere near the bar at the Main Ship Channel. Whereas the Second Stone Fleet reported location also seemed to fall short of where the Federal navy implied they were sinking the vessels. The georeferenced 1858 chart, however, gave a good location for the bar; MRD used that location rather than Wagner's account to create the initial survey blocks for the First Stone Fleet. The Federal account of sinking the vessels between Rattlesnake Shoal and the mainland, and the Confederate account that they were scuttled to the west of the shoal at the entrance to Maffitt's/Beach Channel helped to situate the Second Stone Fleet survey block (*ORN*, ser. 1, vol. 12:423-424, 511-514). The proximity of the wrecks of the blockade runners *Georgiana*, *Mary Bowers*, and *Constance* sunk while evading the blockaders and sunken obstructions by steering for the beach route closer to Sullivan's Island, lent empirical support to our placement of the survey block.

Besides our efforts to locate the First Stone Fleet, Clive Cussler and his organization NUMA in 1981 reported finding numerous magnetic anomalies at the general vicinity of the Main Ship Channel sea entrance. Visual inspection of the magnetic anomalies by his team revealed nothing protruding above the bottom, and the sources were presumed buried (http://www.numa.net/expeditions/siege_of_charleston_expedition.html. [24 March 2011]). The Cussler coordinates provided on the webpage were approximately 345 m (377 yd) northeast from the channel centerline of the MRD georeferenced 1858 nautical chart used to situate the initial survey block. Those coordinates were positioned, however, within the MRD survey block.

Additionally, Cussler's efforts to locate the Confederate submarine *H.L. Hunley* in 1980-1981 and again in 1994-1995 potentially included the location of the Second Stone Fleet. The 1994-1995 eastern survey boundaries extended northwards to a point about a mile and a half beyond Breach Inlet along the shoreline of Isle of Palms and southwards to beyond the remains of *Housatonic* and eventually to *H. L. Hunley*. The eastern central portion of Cussler's search area was just inside the western tip of Rattlesnake Shoal, referenced as the sinking point of the Second Stone Fleet. No mention, however, was made in the 1980s or in the 1990s about discovering the presence of the Second Stone Fleet, although several wooden wrecks were detected and briefly investigated in other areas of the survey block (Browning

and West 1984:111-112; Wilbanks and Hall 1997). This may also be a result of only investigating larger magnetic anomalies indicative of the iron submarine.

First Stone Fleet Survey Operations

Survey protocols developed for the initial search phase called for a 50 m (164 ft) lane spacing at a boat speed between 6-7 knots with the primary instrument the magnetometer. MRD intended for the wider lanes and faster speeds to cover more territory, and while probably not detecting every potential vessel in the fleet, would at least pinpoint an area to conduct further investigation. Refining operations at prioritized anomalies detected in the initial phase of the survey would then be scrutinized in more detail with 20 m (21.8 yd) lane spacing, going at a slower boat speed of 4-5 knots and deploying a magnetometer and a side-scan sonar. Following this phase, and if warranted by a magnetometer anomaly bearing the signature of a potential shipwreck with no associated acoustic image, then the sub-bottom profiler would be deployed to determine the scope and nature of the buried object. This survey methodology was also used during the remote sensing operations for the Second Stone Fleet. Magnetic signatures of the stone fleet vessels were anticipated to be small due to the stripping of large iron components, i.e., anchors, rigging, etc. from the ships prior to scuttling, but perhaps of some duration with the presence of iron fasteners and if the stones contained magnetite. In addition to the First and Second Stone Fleet vessels, other unfortunate victims of the bar and shoal from different periods in Charleston's maritime history were expected to be snared in the electronic net cast for the stone fleets.

On six occasions, 23 March 2009, and 9-10 March, 27-28 September, 13-14 October 2010, MRD undertook remote sensing operations in an effort to locate the remains of the First Stone Fleet (Figure 39). Approximately 12.2 sq. km (4.7 sq. miles) were covered during this phase of the project. Water depths in this area were between 3.0-3.9 m (10-13 ft). Using the georeferenced chart to site the old main channel onto the modern seascape, MRD prioritized the area closest to the bar as high priority and then worked west and then east of the line. The starting survey block was cruciform in shape with a longitudinal axis running northwest to southeast 1,615 m (1,766 yd) in length that ran along the old ship channel, and an area on a northeast to southwest axis 1,225 m (1,339 yd) in length that encompassed the general area of the old bar. This section contained the coordinates from Cussler's webpage. A number of magnetic anomalies were detected in the initial foray and ranged in amplitude from 8-28 gammas. None of these anomalies, however, were located in the general area of Cussler's coordinates. Several of the anomalies were subsequently re-investigated with the magnetometer, side-scan sonar, and sub-bottom profiler on 23 April 2009. None of the first set of anomalies proved associated with a shipwreck from the stone fleet or another era.

Later in the survey, however, MRD detected a shipwreck with the magnetometer and the side-scan sonar. The vessel measured approximately 28.0 m (92 ft) in length, 3.9 m (13 ft) in breadth, and protruded 1.5 m (5 ft) above the surface. The maximum magnetic amplitude was 176.2 gammas. Depth of water was 6.7 m (22 ft). Perhaps a more recent shipwreck due to the amount of visible wreckage remaining, future visual inspection by divers will help to identify the time period of the shipwreck. Additionally, a shipwreck marked on the 1858 nautical chart to the northeast of the Main Ship Channel entrance was

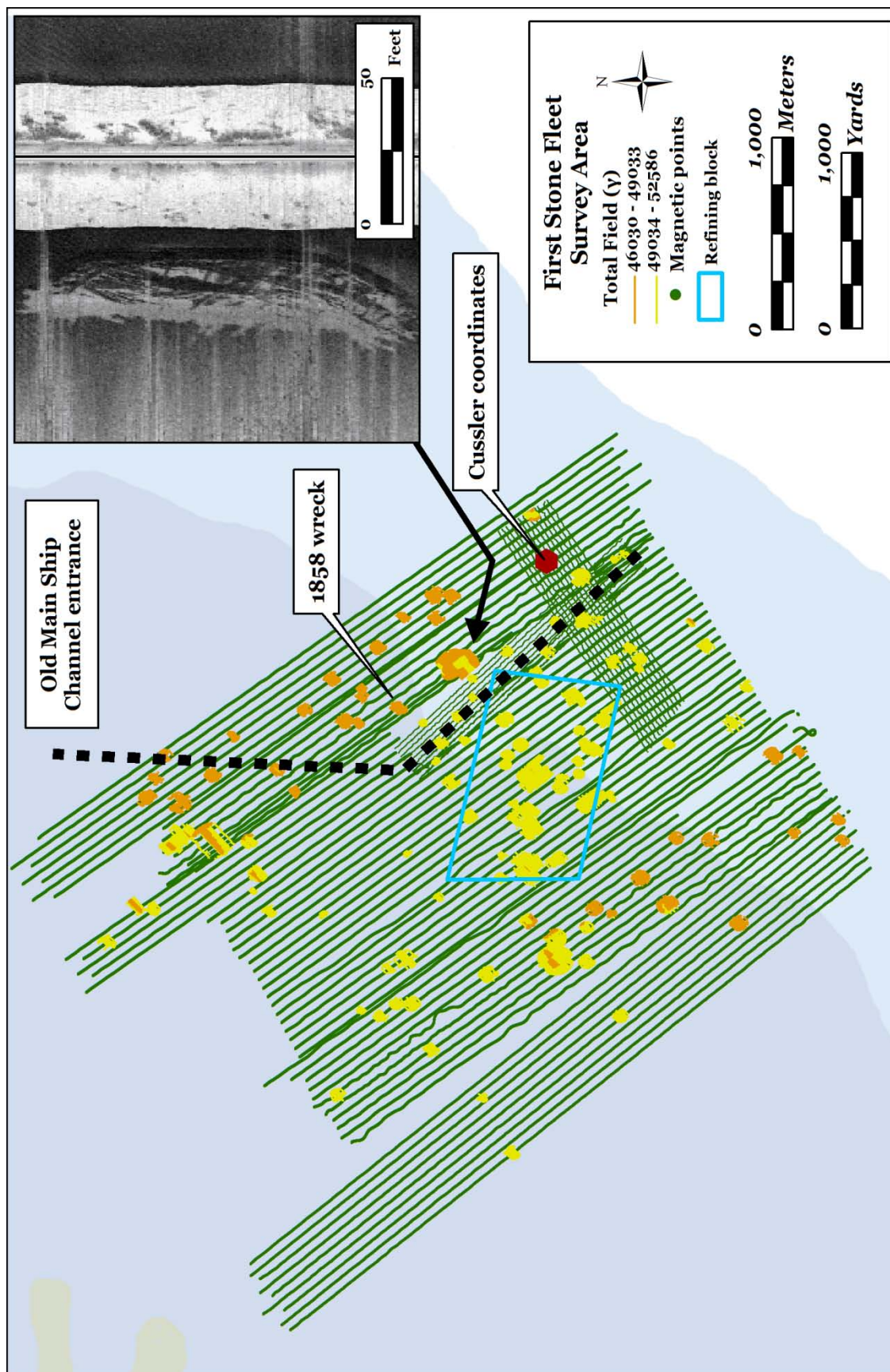


Figure 39: First Stone Fleet survey area. Inset-Sonar image of shipwreck (NOAA chart 11521, scale 1:80,000, 2010; SCIAA graphic).

probably detected during the course of the survey. The multi-component magnetic anomaly had an amplitude of 18 gammas and a duration of 17 seconds. The anomaly disturbed one lane and affected a 3,181 sq m (3,804 sq yd) area. Depth of water was approximately 4.8 m (16 ft). No acoustic image was generated and the wreck is probably buried.

MRD expanded the survey further west, as well as north and south, and then east in an effort to locate the fleet. This was accomplished by several forays from 2009-2010. Finally on the last week of survey in October 2010, MRD started to identify a pattern of magnetic anomalies that proved of interest. On 14 October 2010, a 1,117 m by 686 m (1,221 by 750 yd) search block was created around a cluster of magnetic anomalies ranging in amplitude from 10-47 gammas with good duration. Survey lanes were spaced 20 m (21.8 yd) apart, with a boat speed of 4-5 knots, and deploying the magnetometer and Humminbird sonar. Each survey transect gathered electronic evidence that corresponded favorably to the anticipated features expected with the First Stone Fleet.

In this search area, sixteen presumed ballast mounds were detected, most likely indicating the presence of shipwrecks. Fourteen of the wrecks lie in a cluster, with another two outliers 403 m (440 yd) and 890 m (973 yd) further to the west from the main cluster (Figure 40). The sonograms showed the presence of ballast mounds, and in a few instances, there were some man-made objects clearly visible on the bottom (Figure 41). Dimensions of three of the ballast mounds provide an example of their general size. Two ballast mounds on a north-south longitudinal axis, SF1-Ballast Mound-12 measured 15.2 m (50 ft) north/south axis and 5.2 m (17 ft) east/west axis; SF1-Ballast Mound-05 measured 13 m (43 ft) north/south axis and 5.8 m (19 ft) east/west axis; and one on an east/west longitudinal axis, SF1-Ballast Mound-11 measured 3.6 m (12 ft) north/south axis and 12.8 m (42 ft) east/west axis. The bottom appears featureless, probably a mixture of sand and heavy muds, although in some areas sand ripples extend out from several ballast mounds. Excluding the two outliers, the cluster of ballast mounds cover an approximate distance from north to south of 665 m (727 yd) and east to west of 485 m (530 yd).

Diving Operations

From 20-22 September 2011, MRD archeologists and volunteers conducted reconnaissance dives on several ballast mounds believed associated with the First Stone Fleet (Figure 42). The objectives of the visual inspections were to identify the ballast mounds as remnants of the stone fleet, including whether the two outliers were part of the obstruction, and to perhaps identify the remains of *Robin Hood*, the vessel intentionally burnt by the navy. In general, the ballast mounds range in height from 1.5-1.8 m (5-6 ft) above the ocean bottom and are covered in a heavy concretion composed of sediment and marine growth. Depth of water ranges from approximately 4.5 to 7.6 m (15-25 ft), and visibility was limited between 0.3-0.9 m (1-3 ft). A variety of sea life inhabits the rock piles including sea whips, sponges, sea urchins, crabs, and fish. Surprisingly, none of the sites bore evidence of fishing activity or shrimp net snags, although there was a small length of large modern hawse line entangled in one site.

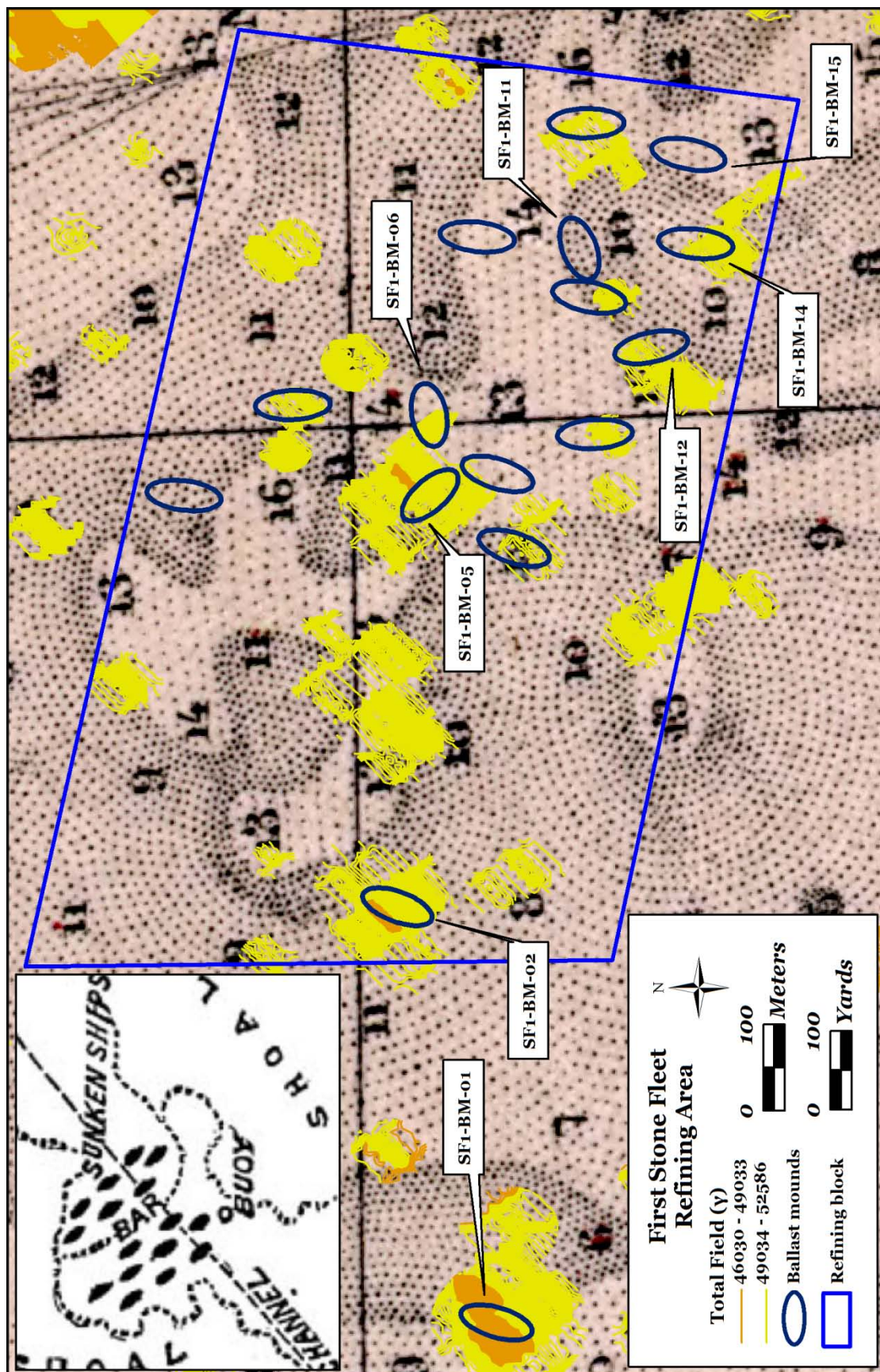


Figure 40: First Stone Fleet refining survey area and ballast mounds. Inset—New York Herald 23 December 1861 illustration depicting stone fleet location (US Coast Survey 1858; SCIAA graphic).

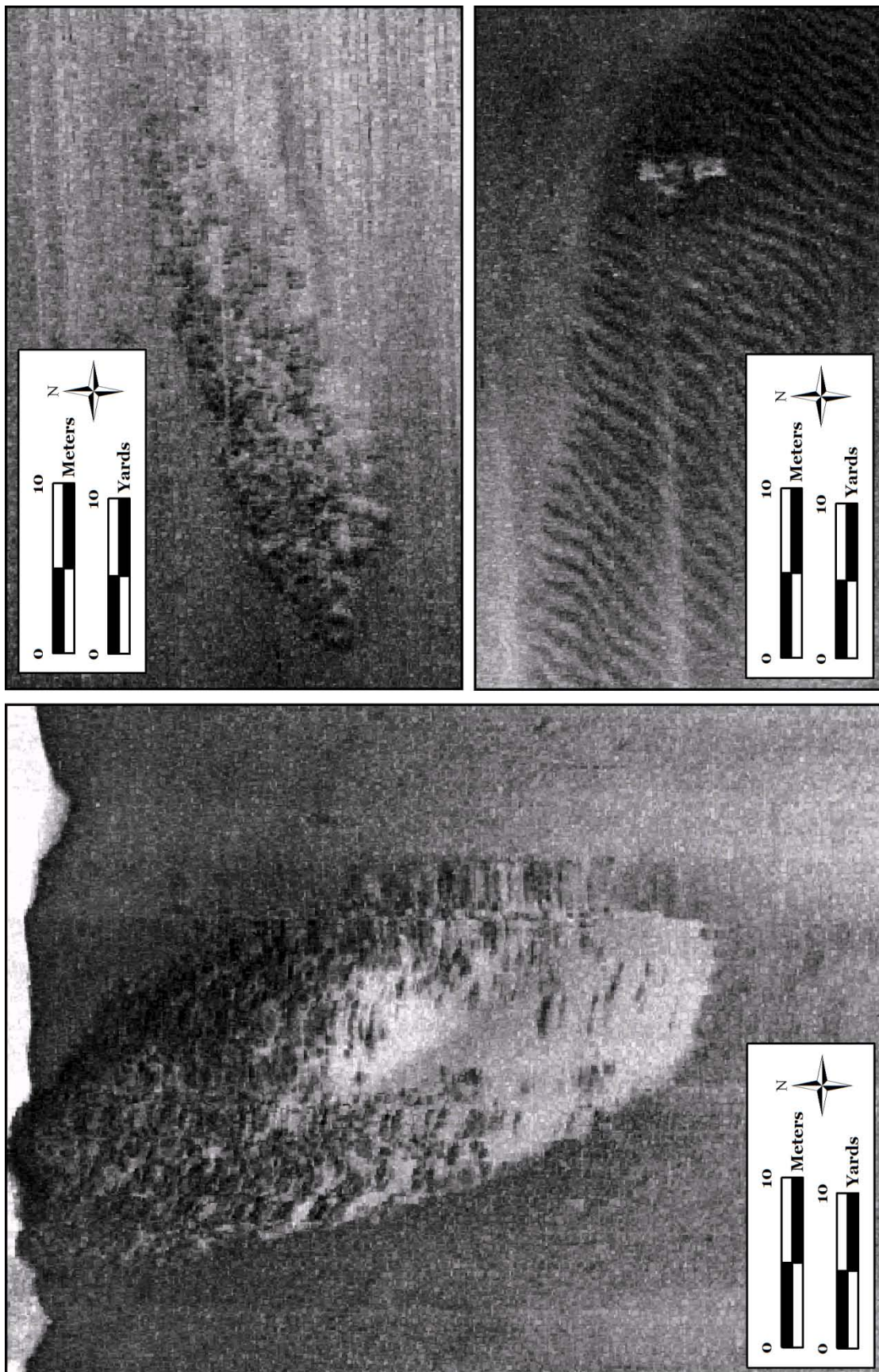


Figure 41: First Stone Fleet ballast mound sonograms. Left image—SF1-BM-12; Right top—SF1-BM-11; Right bottom—Isolated object (SCIAA graphic).

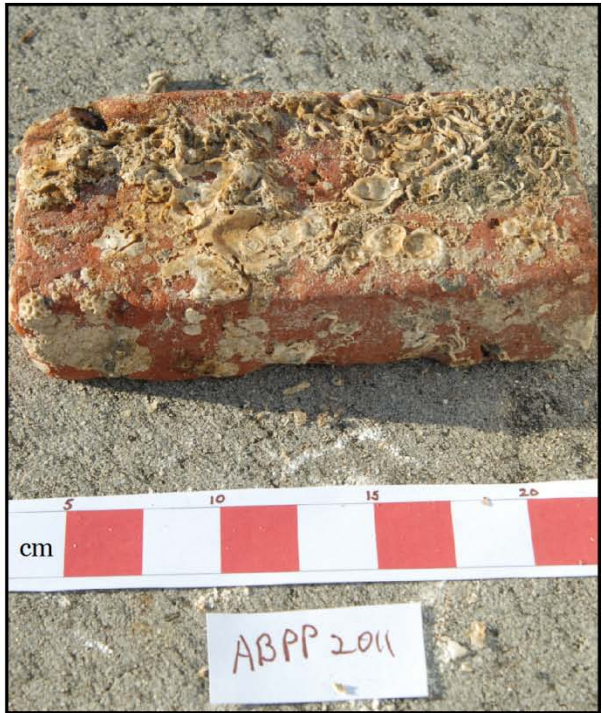
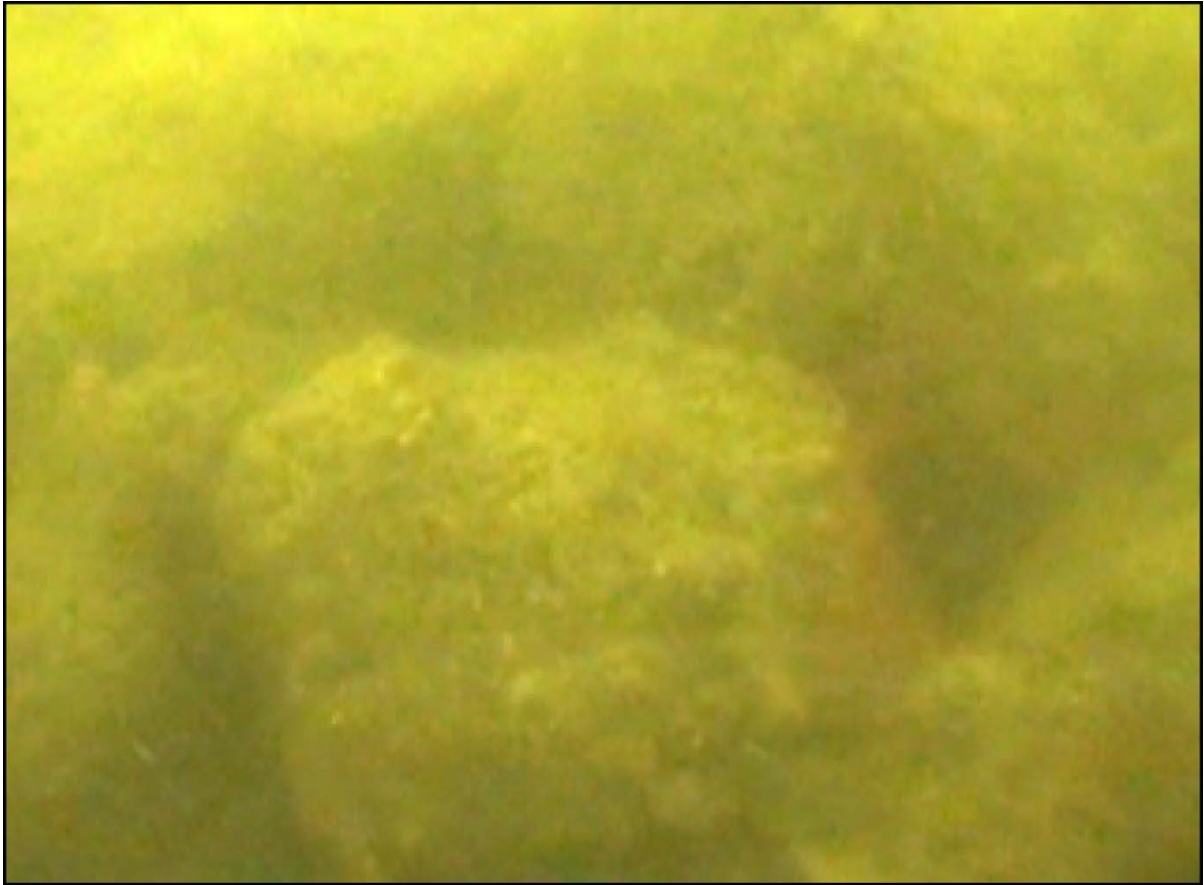


Figure 42: Ballast from First Stone Fleet ballast mounds. Top—Ballast rocks from SF1-BM-05 (SCIAA photo); Left Bottom—Ballast rock recovered from ballast mound (S. Harris); Right Bottom—Brick recovered from ballast mound (S. Harris).

On 20 September 2011, visual investigations occurred on ballast mound SF1-BM-14, one of the southernmost vessels associated with the stone fleet. Visibility was limited, although lights did aid detailed inspection of interesting features. The ballast mound was oriented north-south, and measured approximately 18.2 m (60 ft) in length and 9.2 m (30 ft) in width. Working along the periphery of the ballast mound, archeologists located a loose copper-alloy gudgeon. The end of the gudgeon hole, to accept the pintle, pointed out of the ballast pile with the arms extending back into the ballast pile. The gudgeon measured about 40 cm (16 in) long, had a thickness of 2 cm (0.75 in), a width of 8 cm (3 in), and the pintle hole about 8 cm (3 in) in diameter. The gudgeon had been fastened to the stern post with iron fasteners. A loose copper-alloy drift pin was located near the gudgeon. No wood or other structural components were located on the wreck. All the rocks composing the mound were fairly small, with an occasional large one. All were covered in a coating of heavy sediment and marine growth concretion. Numerous Purple-spined Sea Urchins occupied the wreck. No evidence of burning was found at this site. Nothing of note was found on the top of the ballast pile.

On 20 September 2011, MRD archeologists and volunteers investigated SF1-BM-15, another of the southernmost vessels associated with the stone fleet. Visibility was very limited on the site. The ballast mound was oriented roughly north-south, and measured approximately 12.2 m (40 ft) in length and 4.3 m (14 ft) in width. The ballast rocks were similar to SF1-BM-14, covered in a concretion of sediment and marine growth, and fauna, although with fewer sea urchins. Along the periphery of the mound a copper-alloy strap was found sticking out of the sand. The strap measured approximately 3.8 cm (1.5 in) wide and had some fastener holes about 2.5 cm (1 inch) in diameter visible. A copper-alloy drift pin and a brick were recovered for diagnostic purposes. Nothing of note was found on the top of the ballast pile.

On 22 September 2011, MRD archeologists dove on SF1-BM-06. This site was chosen due to its east-west orientation, one of only two ballast mounds situated in this direction. The ballast mound rose approximately 1.8 m (6 ft) off the bottom, with the ocean or south side of the wreck steeply rising from the bottom, while the land or north side slopes downwards and level to the sand. The mound measured approximately 14 m (46 ft) in length and 4.9 m (16 ft) in width. Visibility was very limited. The rocks at this site, as with the other ballast mounds, were heavily coated in concretion. Searching along the ballast mound, archeologists discovered a concreted iron object, most likely an iron pipe, approximately 4.5 m (15 ft) in length, 20 cm (8 in) in diameter, a thickness of 7.5 cm (3 in) and a 12.5 cm (5 in) diameter hole. A number of wooden squares, most likely frame tops, protruded out and were interspersed in the ballast mound. Several copper-alloy fasteners were observed lying along the periphery of the wreck.

On 21 September 2011, visual inspections occurred on the furthestmost outlier to the west, SF1-BM-01, from the main concentration of ballast mounds. Limited visibility, along with numerous Long-spined Black Sea Urchins, hampered detailed analysis of the site, but did reveal the metal structure was not associated with the stone fleet. The site stood approximately 1.8 m (6 ft) off the bottom, oriented almost east-west, and measured approximately 27 m (91 ft) in length and 11 m (36 ft) in width. The structure consisted of an

iron or steel structure comprised of beams and tubular objects. The site is most likely a fairly modern wreck, and therefore has no association with the First Stone Fleet.

On 22 September 2011, a dive took place on SF1-BM-02, the innermost outlier to the west of the main concentration. The ballast mound was oriented roughly northeast-southwest, and measured approximately 13.4 m (44 ft) in length and 6 m (20 ft) in width. Visibility was good at about 0.6-0.9 m (2-3 ft). The rocks were covered in the similar concretion as the other ballast mounds, although the stones appeared consistently smaller on this pile than those on the others. A copper-alloy fastener, seemingly consistent with the others sites, was discovered. Resting against the rocks on the periphery of the mound was a heavily concreted metal object, about 0.3 m (1 ft) in length, round on top and bottom about 15 cm (6 in) in diameter, with a cylindrical middle, resembling a dumbbell. On another side of the ballast mound was evidence of wood, perhaps a ceiling plank or an outer plank of hull. There was nothing of note located on top of the ballast mound. Unless additional evidence suggests otherwise, MRD believes this outlying site is connected to the stone fleet.

On 21 and 22 September 2011, MRD archeologists dove on SF1-BM-05 (Figure 43). The ballast mound was oriented north-south. This ballast mound was atypical of the other mounds, as there was a solid pile of rocks measuring approximately 13 m (43 ft) in length and 5.8 m (19 ft) in width, and then a scatter northwards about 10 m (33 ft) beyond the main pile. The rocks were covered in the typical hard concretion of sediment and marine growth as the others. Visibility varied each day. Besides the rocks, a number of structural components were found along the periphery of the ballast mound. A large iron rectilinear object, approximately 3 m (10 ft) in length and 10 cm (4 in) in thickness and width, with a couple of fasteners protruding from the feature was located at the north end of the ballast mound. On the west side of the wreck, a series of frames was found sticking out from the ballast rocks and embedded in the bottom. The frames measured 20 cm (7.8 in) sided and were spaced 2-5 cm (0.7-1.9 in) apart. Several copper-alloy fasteners protruded from them measuring about 1.5 cm (0.5 in) in diameter, and a thicker one of around 2.5 cm (0.9 in). Nothing of note was found on top of the ballast pile.

At the north end of the wreck, and presumed stern of the shipwreck, a series of large copper-alloy drift pins were located. These fasteners rose approximately 0.6-0.9 m (2-3 ft) off the bottom and were used to fasten the stern and deadwood components. The fasteners were approximately 2 cm (0.8 in) in diameter and spaced about 0.6 m (2 ft) apart. In addition to the large drift pins, several were paired with a smaller copper-alloy fastener of similar diameter but only about 0.3 m (1 ft) in height. Based on these fasteners, the construction of the stern deadwood assembly became clear. The shipwrights used the smaller paired fasteners to secure together a couple or more deadwood components, including the stern elements, i.e., stern knee and keel. Several more deadwood pieces were added and then the long fasteners secured the entire assembly as one. While some of the long drift pins stood straight up from the bottom, there were some that were bent over in a 90 degree angle, mostly in the same direction (Figure 44). This seems to indicate that at some point the stern structure collapsed, possibly due to the weight of the ballast rocks, or rough surge and seas, which bent the fasteners. The collapse theory seems to be supported by the presence of several copper-alloy spikes, as well with several copper-alloy drift pins, sticking straight up

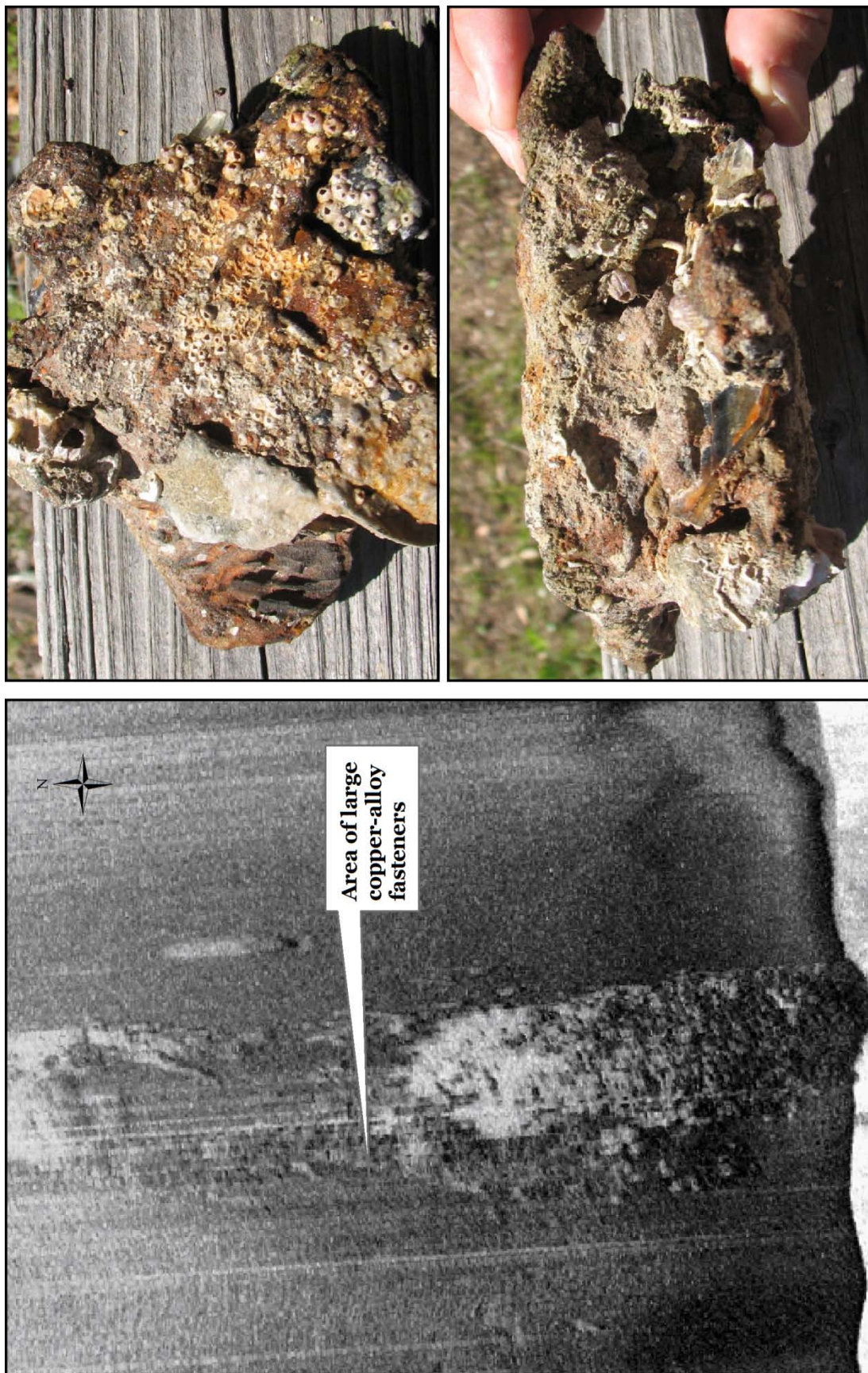


Figure 43: Left—Sonogram of SF1-BM-05 (SCIAA graphic); Right Top—Concretion recovered from ballast mound containing wood, glass, and iron (A. Deming); Right Bottom—Same object different view showing glass fragment (A. Deming).



Figure 44: Fasteners on SF1-BM-05. Top—Head of bent copper-alloy fastener; Middle—Bent section of copper-alloy fastener; Bottom—Copper-alloy spike (SCIAA photos).

out of the bottom and into the water column, adjacent to the large and smaller fastener pairs. An arrangement caused, most likely, by the outer hull planking and frames falling to the ocean bottom. The eventual deterioration of the wood exposed the spike tips and drift pins. A loose spike confirmed that one end of the fastener was a spike and the other hammered flat (See Figure 44). Wood noted at the base of several of the fasteners was severely eroded. In addition to the stern and deadwood fasteners, there were two other types of drift pins located in this area of the wreck: one stubby and thick, and another longer and thinner. There was also a spiral shaped stubby drift pin, another indicator of the structural collapse of the shipwreck.

One interesting item was recovered from the shipwreck, a concretion visibly consisting of an iron fastener, wood, and clear and dark-green glass fragments (See Figure 43). While these concretions are often found on shipwrecks, especially those located in saltwater, where the iron corrosion products diffuse to form conglomerations of sand, biologicals, and near-by artifacts, this one seems different. It appears as if the items have been fused together through intense heat to form the conglomeration. This artifact, coupled with the evident collapse of the stern, and the scattered remains to the northwards of the stern, seems to point that this site may represent the burned *Robin Hood*. The identity of this shipwreck as a potential candidate for *Robin Hood*, however, needs additional testing, as well as at the other sites to discount other viable contenders.

In summary, visual inspection by MRD archeologists and volunteers determined the ballast mounds, except one site, are part of the stone fleet. The furthest outlier from the main concentration, SF1-BM-01, most likely a modern construct, was unrelated to the stone fleet. MRD detected some evidence that SF1-BM-05 may represent *Robin Hood*. Therefore, we have located the remains of fifteen, and perhaps the identity of one, of the reported sixteen vessels of the First Stone Fleet. To locate the unaccounted ballast mound will require additional survey work.

First Stone Fleet Analysis

The historical accounts state that 16 vessels were scuttled in the First Stone Fleet. According to the *New York Times* reporter, who was fairly descriptive of the process, “The main channel of approach to Charleston Harbor has been destroyed. Sixteen stone-filled hulks, placed checkerwise across the passage, in the deepest water, just at the inner and outer edges of the bar...” and further “The wrecks are not ranged in a straight line across the channel...The hulks are placed in three lines, checkerwise” (*New York Times* 21 December 1861). The *New York Tribune* reporter provided an illustration that outlined the general dimensions that had been buoyed for the scuttling operation confined within an area about an eighth of a mile long on a northeast to southwest orientation and about half that in breadth over the bar (Moore 1862:507). The general drift of the main cluster of ballast mounds does, however, correspond with the reported northeast-southwest boundaries. The MRD findings indicate the clusters northeast to southwest distance is a fifth of a mile, but if including the nearest outlier, SF1-BM-02, only make a sixth of a mile. The breadth or the northwest to southeast measurement is about a fourth of a mile. This measurement corresponds to the *New York Tribune*’s reporter’s breadth dimensions but does not correspond to the length

measurement. If the outlier, SF1-BM-02, is a stone fleet vessel as supposed, then a significant gap of two-tenths of a mile, or 440 yards, existed between that ballast mound and the main cluster. Or perhaps the missing ballast lies within this area to reduce the gap.

Another illustration showing the sunken positions of the Stone Fleet was located in the *New York Herald's* 23 December 1861 edition. The illustration shows the arrangement of the vessels in five lines and staggered and broadsides to the channel. There was a statement that the navy commander wanted the vessels arranged broadsides to provide more of a channel impediment. The illustration was roughly georeferenced to the 1858 nautical chart. The sunken fleet falls within the area of the MRD detected shipwrecks but the spatial distribution looks a bit more disorganized than the documentary accounts proclaim.

As mentioned above, fourteen of the ballast mounds are in close proximity to each other, with one outlier further away to the west. The reports do not mention, nor does the illustration show, a vessel sunk or escaping control to a location distant from the bulk of the hulks. Interestingly, the *New York Tribune* reporter does mention two vessels did, however, swing out of alignment while sinking. The basic longitudinal axis of the ballast piles is north-south. Two ballast mounds (SF1-BM-06 and SF1-BM-11), however, are on an east-west axis and might likely represent those two that shifted out of position while sinking. So there are two possible interpretations based on the reports and illustration: 1) these two wrecks were actually the only two that were sunk broadsides as reportedly desired and the remainder are oriented wrong, or 2) the vessels were sunk deliberately along a north-south axis and these two went out of alignment along an east-west axis. Interpretation two seems more likely.

In addition to the Union efforts to block the Main Ship Channel, accounts state the Confederates sank four blockships during the initial attempts to prevent succor reaching Fort Sumter in 1861 (*ORA*, ser. 1, vol. 1:138-139). So it is possible that 20 ships rest in proximity to each other at the bar related to efforts by both sides to stop up the channel. Besides the stone fleets, there are also other ships noted and supposed lost in the area. The search block concentrated on a cluster of magnetic anomalies, but there are also a number of other anomalies in the vicinity that are worth investigating in the future to determine whether they represent the missing stone fleet vessel, Confederate blockships, or shipwrecks from a different historical period. An interesting archeological venture awaits to determine the possibility of discovering the potential identities of each supposed shipwreck, based on the reported sequence of sinking, including the burning of *Robin Hood*, along with the size of the ballast mounds and the documented tonnage of rocks loaded for each ship. MRD has identified and documented at least one known shipwreck, possibly *Edward* or *India*, intended for the stone fleets, but instead diverted for naval use as a floating machine shop in Station Creek, Port Royal Sound (Spirek and Amer 2004:192-196). Future visual inspection and additional research by underwater archeologists will continue to document the remains of the Union efforts to hamper blockade running by obstructing the main avenue of approach into Charleston Harbor.

Second Stone Fleet Survey Operations

A similar survey protocol to find the First Stone Fleet was used in the attempt to locate the Second Stone Fleet at the entrance to Maffitt's/Beach Channel off Sullivan's Island. Survey operations occurred on 9 and 10 March 2009 and again on 8 March 2010 (Figure 45). The survey block measured 3.5 km (2.2 mi) in length and 0.9 km (0.5 mi) in width. Approximately 3.6 sq km (1.4 sq mi) of bottom was surveyed. MRD's survey block extended from the western tip of Rattlesnake Shoal and northwards to just below the wreck of the blockade runner *Constance*. The southwestern portion of the search area just encroached in the NUMA 1994-1995 *Hunley* survey area. Modern nautical charts mark two obstruction areas and two wrecks to the east of the initial starting point of the survey. See below for additional information about the identities of these sites. The initial survey located several magnetic anomalies of interest, and operations to gather additional magnetic and acoustic data occurred on 24 March 2009. Magnetic anomaly SF2-1 proved of significance especially when sonar revealed the presence of a presumed ballast mound in 5.8 m (19 ft) of water. The ballast mound measured approximately 10 m (32 ft) north to south, and 15 m (49 ft) east to west (Figure 46). The other magnetic anomalies had no acoustic images associated with them and were presumed buried.

On 1 April 2010, archeologists and volunteers dove on the ballast mound, SF2-1, to determine any affiliation to the Second Stone Fleet (Figure 47). Moving around the site quickly dispelled any connection with the stone fleet. The size and sheer weight of the quarried and round stones suggested that these were mechanically lifted onto the sunken vessel in question and not hand-carried by farmers as presumed for loading the ex-whalers. Protruding here and there, copper-alloy drift pins and eroded timbers denoted the presence of wooden structure. A number of iron components littered the periphery of the wreck, mostly components of the vessel's capstan. No other artifacts were found associated with the rock mound. Nearby to this shipwreck and marked on the nautical charts are several obstructions and wrecks. MRD investigated these sites on 19 and 22 April 2010 to determine their association if any with the stone fleet. Depths at these sites ranged from 6.1-7.6 m (20-25 ft). Visual inspection of these sites revealed that three of the sites were practically identical to the SF2-1 site, even down to having the same capstan components. Wreck 1, however, was not detected during a sonar search for the site.

Based on the size of the boulders, evidence of quarrying, and proximity to each other, MRD believes these were lighters or scows used to transport rocks to build the Charleston Harbor jetties from 1878 to 1896. These wrecks mostly likely fell victim to one of the hurricanes that struck the area as the jetties were being built. Historical research of Charleston newspapers during this time period found a report on damages sustained during the hurricane of 25 August 1885 included the sinking of four lighters loaded with stone by Howlett & Company, the contractors for the jetties (*The News and Courier* 28 August 1885). Archeological evidence suggests that these rock-laden wrecks represent the remains of these lighters from the private contractor's fleet. Investigating the shoreline in front of Fort Moultrie, which had been shored up with rocks during the 1870s reveals stones with similar quarrying patterns as those found on the wrecks. More research is needed to solidify the identity of these wrecks and their connection with the jetty project.

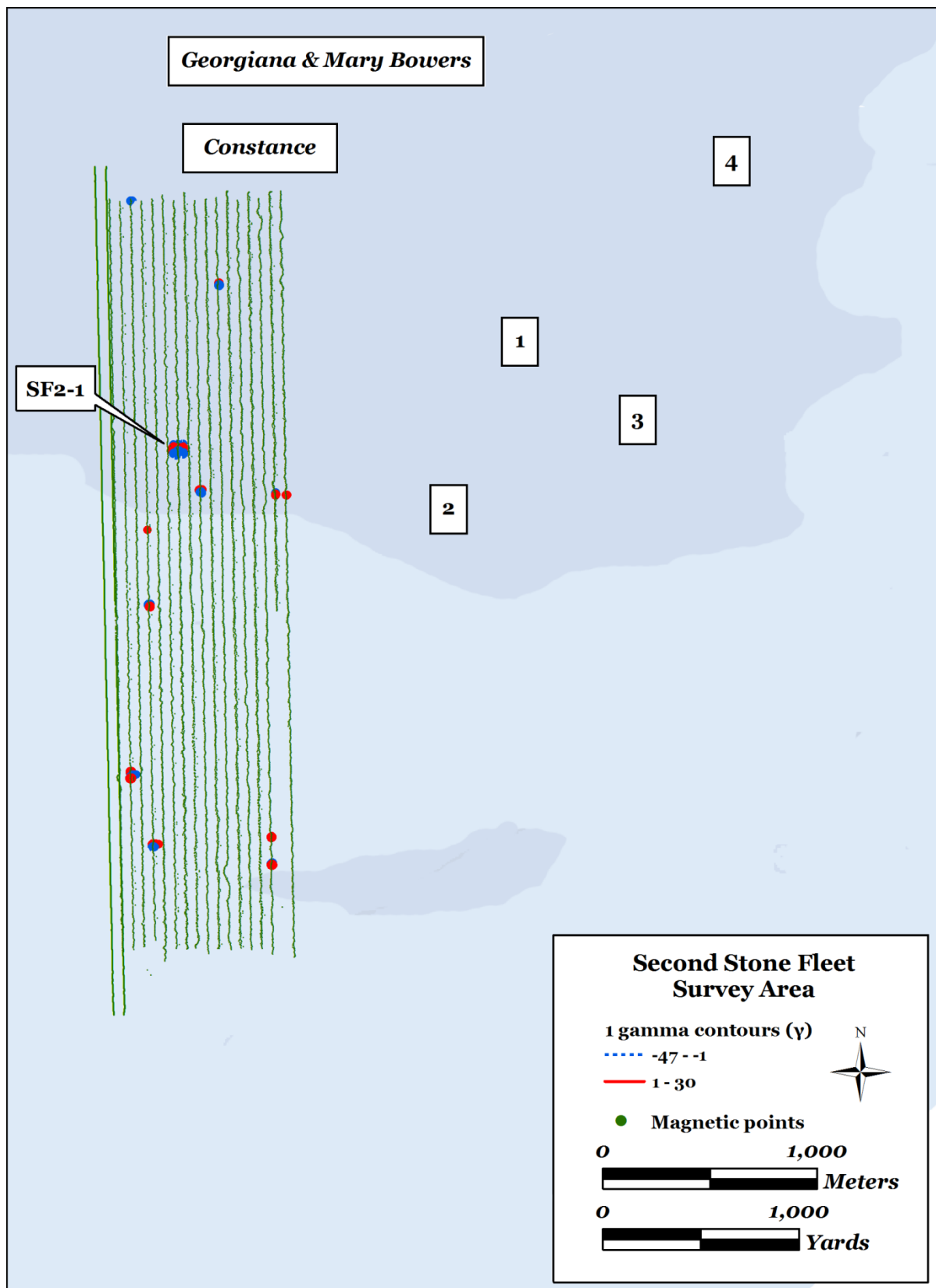


Figure 45: Magnetic contours of Second Stone Fleet survey area (NOAA chart 11521, scale 1:80,000, 2010; SCIAA graphic).

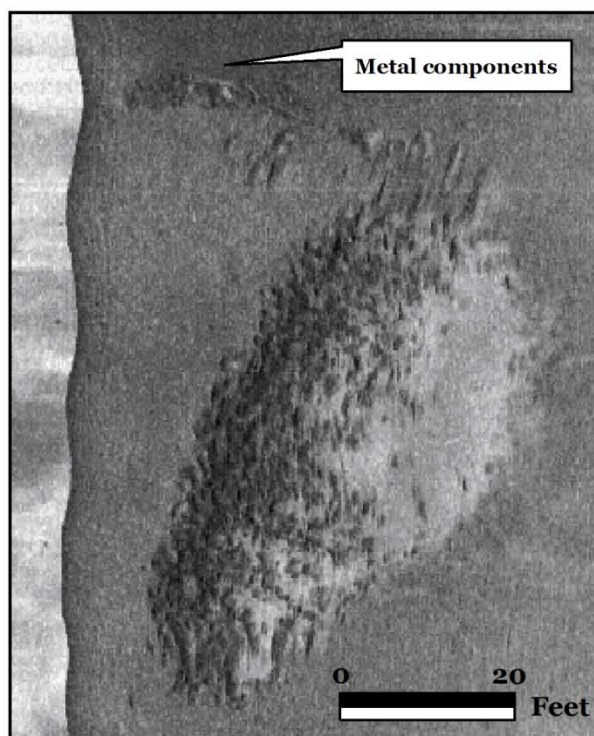
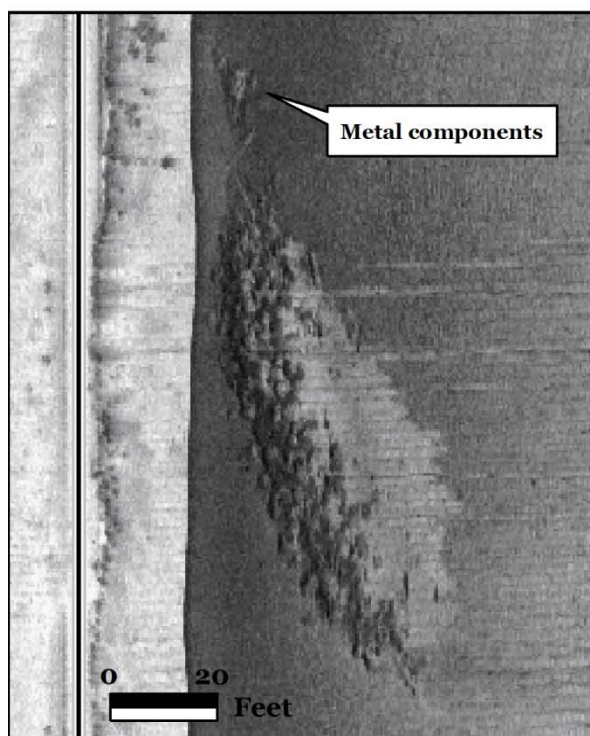
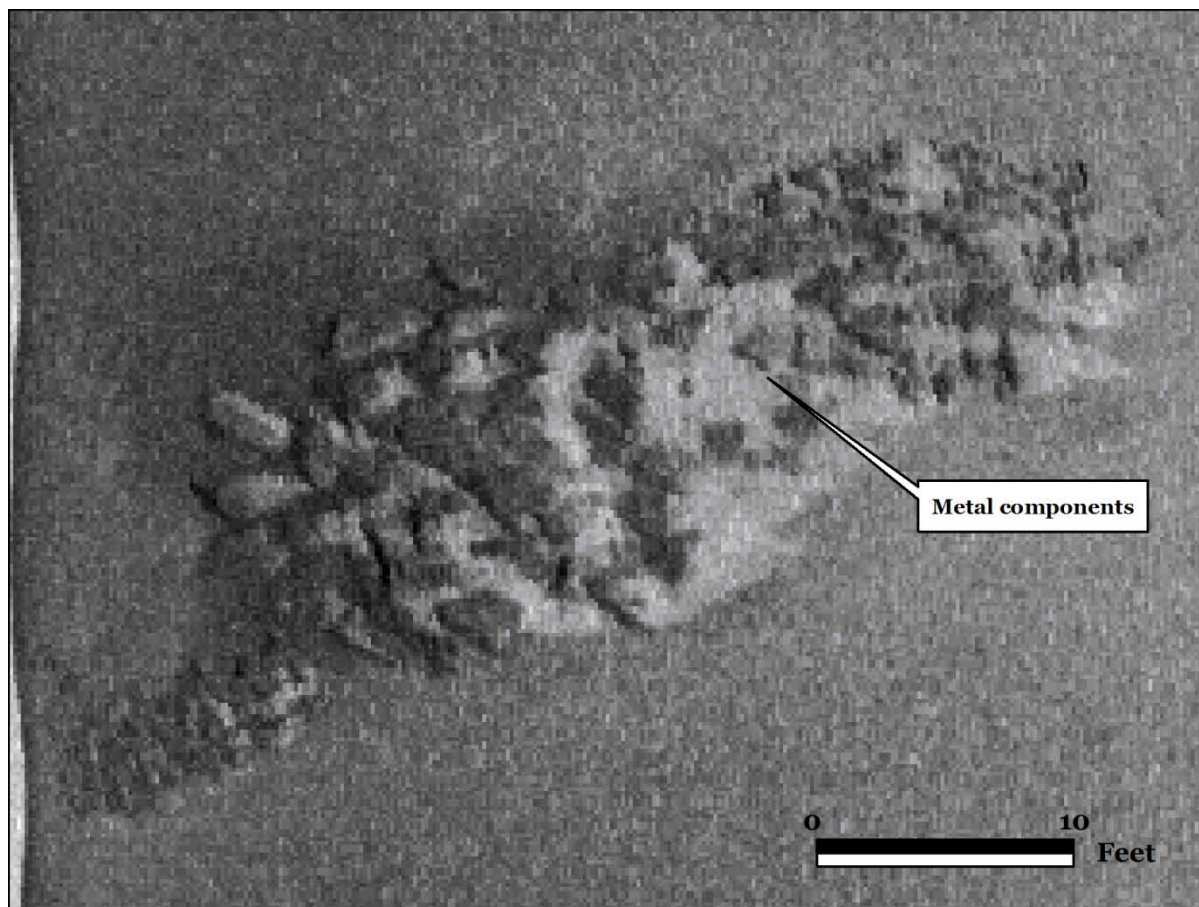


Figure 46: Sonograms of rock barges in proximity to Second Stone Fleet survey area. Top—SF2-1 wreck; Bottom left—Wreck 2; Bottom right—Wreck 3 (SCIAA graphic).



Figure 47: Rock laden wrecks in Stone Fleet 2 survey area. Top—Copper-alloy fastener protruding approximately 20 cm (8 in) from the sand at Wreck 3. Inset: Quarried rock from Ft. Moultrie; Bottom—Iron knee at Wreck 3 (SCIAA photos).

Comparing the results of the magnetics of the First Stone Fleet to the Second Stone Fleet reveals that the remains of the stone fleet at Maffitt's/Beach Channel remain elusive. Additional expansion of survey coverage east and west, and perhaps north and south, should eventually pinpoint the remains of this stone fleet. The placement of these stone fleets had a bearing on how the battlefield evolved and are important features of the efforts to close the harbor to blockade runners.

H.L. Hunley and USS Housatonic Naval Engagement Site

On the night of 17 February 1864, the Confederate submarine, *H. L. Hunley*, captained by George Dixon and hand-cranked by seven crew members, steered towards the wooden steam sloop USS *Housatonic*. Enduring small arms fire on the approach the submarine rammed, attached, and detonated a spar torpedo into the starboard aft quarter of the Union vessel. The warship sank within minutes, with the loss of lives of five sailors. Nearby blockading vessels answered the stricken vessel's distress signals to rescue the crew (NARA, Naval Court of Inquiry Case #4345, RG 45, M625). After the explosion and the subsequent years following the submarine's failure to return to port, the fate of the Confederate submarine and its crew had captivated many to search for the vessel.

Several days and for some months after the incident, the Federal navy while investigating *Housatonic* for salvageable materials, including the recovery of the armament, searched an area 500 yards around the wreck in an effort to locate the submarine. Navy divers in November 1864 also reported the hull of *Housatonic* had settled in the bottom about five feet and had formed a mud and sand bank about the wreck. The interior of the hull was filling with mud, filled with heaps of coal, and a scatter of muskets, small arms, and quantities of rubbish. The divers also reported the rudder and rudder post had partially been blown-off, and the propeller in an upright position and the shaft appeared broken. A snag near the wreck during operations to locate the submarine was investigated by divers but found to consist of a "quantity of rubbish" (ORN, ser. 1, vol. 15:331-334; NARA, RG 45, M625).

In 1870, the Monitor Wrecking Company from New York City was awarded a contract by the US Treasury Department to salvage *Housatonic* and other shipwrecks in Charleston Harbor (*The Charleston Daily News* 8 January 1870). The wreckers found *Housatonic* rested in 36 feet of water on its keel on hard bottom bearing northwest and southeast, its decks and rigging eaten away by worms and beaten by storms, a large portion of the engines recovered, and two smaller guns from its armament. The rest of the guns had been taken up by the government several years earlier. Some of the recovered artifacts included a bottle of Rhine wine and ale, a globular brass lamp, and several metal mountings from officer's swords. One of the divers also recovered an enormous jawbone reportedly human (*The Charleston Daily News* 21 June 1871; 30 July 1870). By late summer, the company had recovered substantial components of the wreck including the propeller, shaft, and stern post, along with a portion of the hull with an aggregate weight of 20 tons. The company also salvaged a banded rifle gun, three large anchors, capstan, a massive chain twelve hundred feet long, and a cooking stove which had a brass plate inscribed "U.S. Navy-yard, Washington, No. 39, 1846." In addition, the company reported sighting the torpedo

boat nearby and was slated for recovery (*The Charleston Daily News* 4 August 1870; 15 August 1870). If seen by company divers, the *Hunley* was apparently not recovered during this time.

On 20 April 1870, Captain William Ludlow, of the US Army Corps of Engineers submitted a report that stated the wreck of *Housatonic* was a navigation hazard and recommended removing it to a depth of 20 feet. He mentioned the wreck had been blasted and contained two boilers of 40 and 50 tons each (NARA-SE Region; Miscellaneous Wrecks, 1871-1888, RG 77, File #1125). In September 1872, Benjamin Maillefert won a bid to begin salvaging the wreck and to remove it to a low-tide depth of twenty feet, and to search for *Hunley*, and recover it if found. From 1872 until 1874, Maillefert's company salvaged a quantity of copper, brass, lead, two tanks, and angle iron. On one occasion in April 1874, the company flat returned loaded with about 500 pounds of copper bolts from the wreck (SCHS-Maillefert). Remaining untouched for approximately 30 years the wreckage again became a navigational hazard due to its proximity to the new main shipping channel between the jetties. On 19 February 1909, a new US Army Corps of Engineers contract was let with a salvage diver named William Virden, who proceeded to blast the two boilers, and then recover the pieces, to a depth of 27 feet at mean low water (USACE 1909:1316).

Archeological Investigations

The first serious and concerted attempts to locate the remains of the submarine initially occurred in 1980 and continued in 1981 by novelist Clive Cussler and his organization, National Underwater and Marine Agency. Working in cooperation with SCIAA, Cussler and his group surveyed with a magnetometer and sub-bottom profiler approximately 24 sq km (15 sq mi) of area between the shorelines of Sullivan's Island and Isle of Palms and beyond the wreck of *Housatonic*. Discovering several promising magnetic anomalies, the group determined several sources were wooden shipwrecks, while others were not ground-truthed due to time constraints. The submarine was not found and remained elusive (Browning and West 1984:111-112; Wilbanks and Hall 1997:84). Returning in 1994, Cussler and his group worked in partnership with SCIAA to search for the submarine; Cussler's group responsible for conducting the magnetometer survey, and SCIAA for ground-truthing the anomalies. Over 24 sq km (15 sq mi) of area was surveyed primarily with the magnetometer during the 1994 season and extending into 1995, with side-scan sonar and sub-bottom profiler used to investigate prioritized magnetic anomalies. A number of magnetic anomalies were detected, as well as several that were re-detected from the 1980-1981 seasons. Old and new targets were ground-truthed and dismissed as modern debris or wooden shipwrecks. Continuing the effort in late April 1995, NUMA discovered a promising anomaly and conducted visual inspections that proved the magnetic target as the remains of the Confederate submarine *H. L. Hunley* (Wilbanks and Hall 1997:82-87).

Following the announcement of the discovery in 1995, federal and state agencies agreed on a management strategy, including the need to conduct further investigations of the reported *H. L. Hunley* site. In May and June 1996, a cooperative project with the National Park Service Submerged Resources Center, NHHHC Underwater Archeology Branch, and SCIAA was tasked to ascertain whether in fact *Hunley* had been found and, if confirmed,

could the submarine be raised for conservation and display. The submarine was found approximately 305 m (334 yd) to the east of the *Housatonic* wreckage, in 9.1 m (30 ft) of water, and buried approximately one meter (3.2 ft) below the sediments. The submarine's bow was pointed 297° magnetic, and heeled over 45° on its starboard side. Excavation exposed the upper portion of the bow to just forward of the stern area revealing a forward hatch, snorkel box, and a series of five pairs of deadlights between the snorkel box and aft hatch. There was no sign at the top of the submarine's bow that indicated the spar used to fasten torpedo was mounted in this location. Excavation downwards on the port side uncovered the diving plane, and further aft, digging underneath revealed lead ballast blocks attached to the keel. Excavations did not occur at the bow or at the stern at the rudder assembly. Both areas were deemed sensitive, and uncovering those two sections of the submarine was postponed until the recovery progress began in 2000. The submarine was found in relatively good condition, but the discovery of a gaping hole at the site of a port hole in the forward hatch, where Dixon would have peered out forward to guide the vessel, proved interesting and open to speculation as being related to the demise of the submarine. Essentially, findings from the project concluded the NUMA target was indeed *H. L. Hunley* and seemed a viable and worthwhile endeavor to raise the submarine for recovery and preservation and eventual public display (Murphy et al. 1998). The submarine was recovered in 2000 and delivered to the Warren Lasch Conservation Center in North Charleston for preservation (Figure 48).

Intervening between the recovery of the submarine in 2000, the same organizations conducted limited investigations at the *Housatonic* wreck site in 1999 to learn more of the events surrounding the attack. Guided by magnetic contours, a series of hydraulic probes and recording the nature of the contact, i.e., coal, wood, metal, indeterminate, negative, delineated the confines of the wreck. Excavations at selected areas, to a maximum depth of 3.7 m (12 ft), recovered a number of artifacts, including a pistol, pencil, shoe leather, a fuse, and other objects. Importantly, excavation at the position of two water tanks allowed for determining the ship's direction compared to a set of *Ossipee*-class ship plans. The bow of *Housatonic* was pointed 316° magnetic, corresponding favorably to the vessel's reported heading of 298° the night of the attack, and to the fact the vessel sank quickly after the explosion. Excavation also revealed several bent copper-alloy drift pins from the stern area that may reflect the explosion of the torpedo or perhaps subsequent salvage efforts. In addition to examining the wreck, the 3rd Anomaly lying to the south and between the two shipwrecks was identified as a historic buoy used to mark the wreck of *Housatonic*. The 4th anomaly to the north of the sites was a small Admiralty-type anchor (Conlin et al. 2005).

The naval engagement site comprises the two sunken vessels, both roughly pointed in the same direction of northwest-southeast, most likely a result of the strong ebb-flow out the harbor (Figure 49). The tide helped propel the hand-cranked submarine to its target, while *Housatonic* swung with the tide at anchor. The tide may also be responsible for *Hunley*'s location due east of its victim, possibly a deliberate result of the crew's decision to wait for the flood tide before returning to the harbor or an accident related to the attack that proved fatal (Conlin and Russell 2006). Current and ongoing research at the *H. L. Hunley* research center continues to seek the answer to what caused the demise of the submarine.

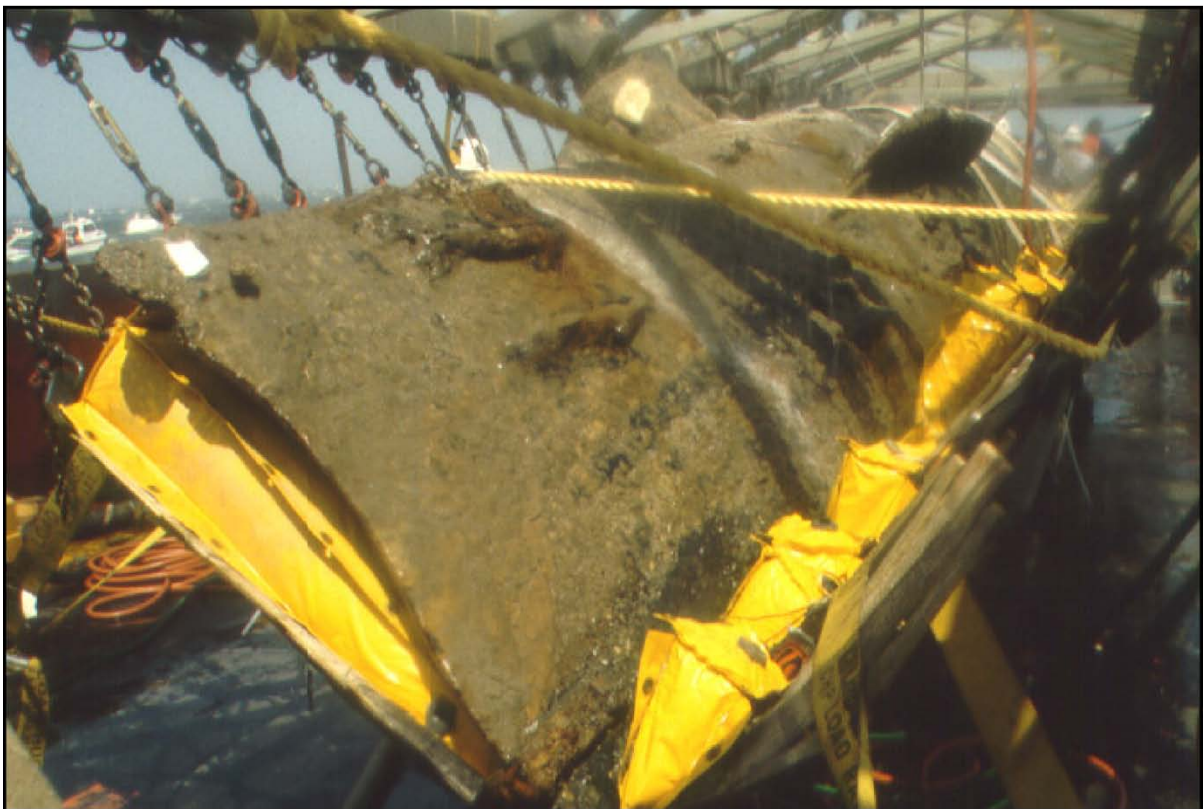
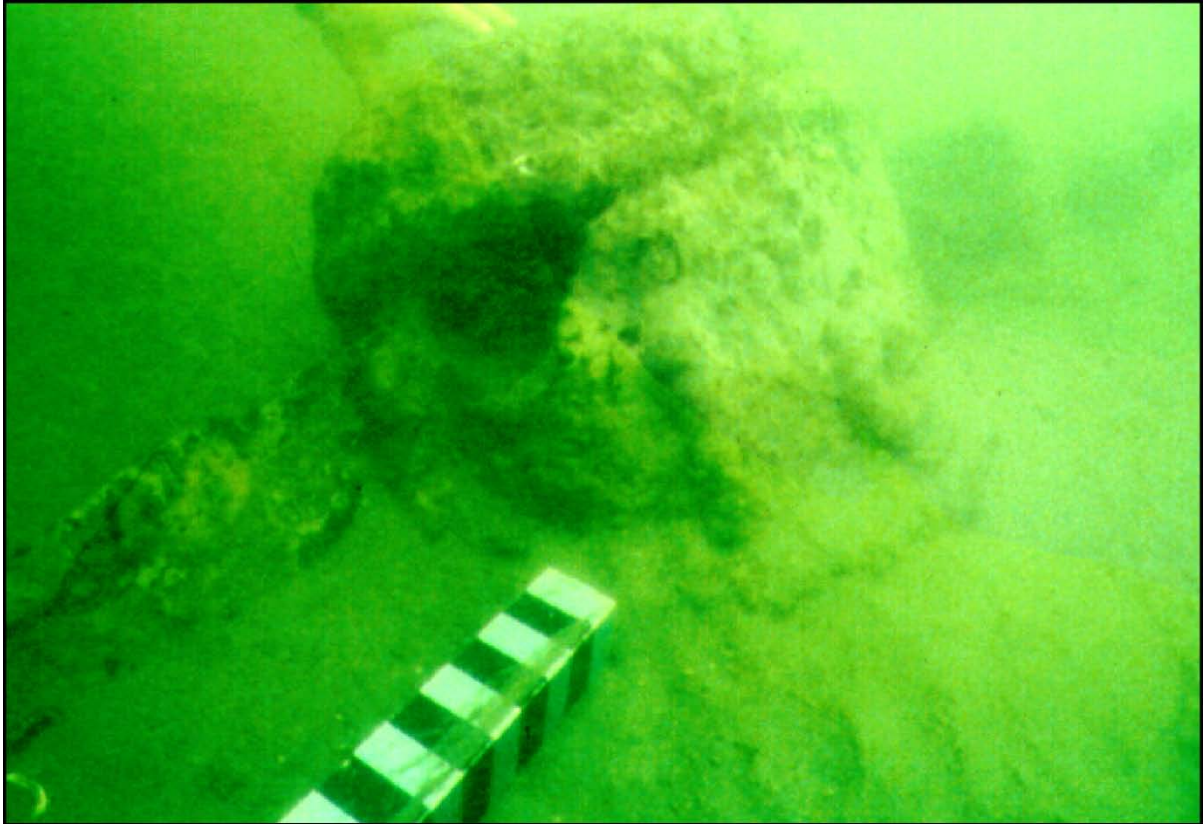


Figure 48: Top—Forward hatch, note hole in forward combing port; Bottom—Bow view of recovered submarine (C. Amer, SCIAA photos).

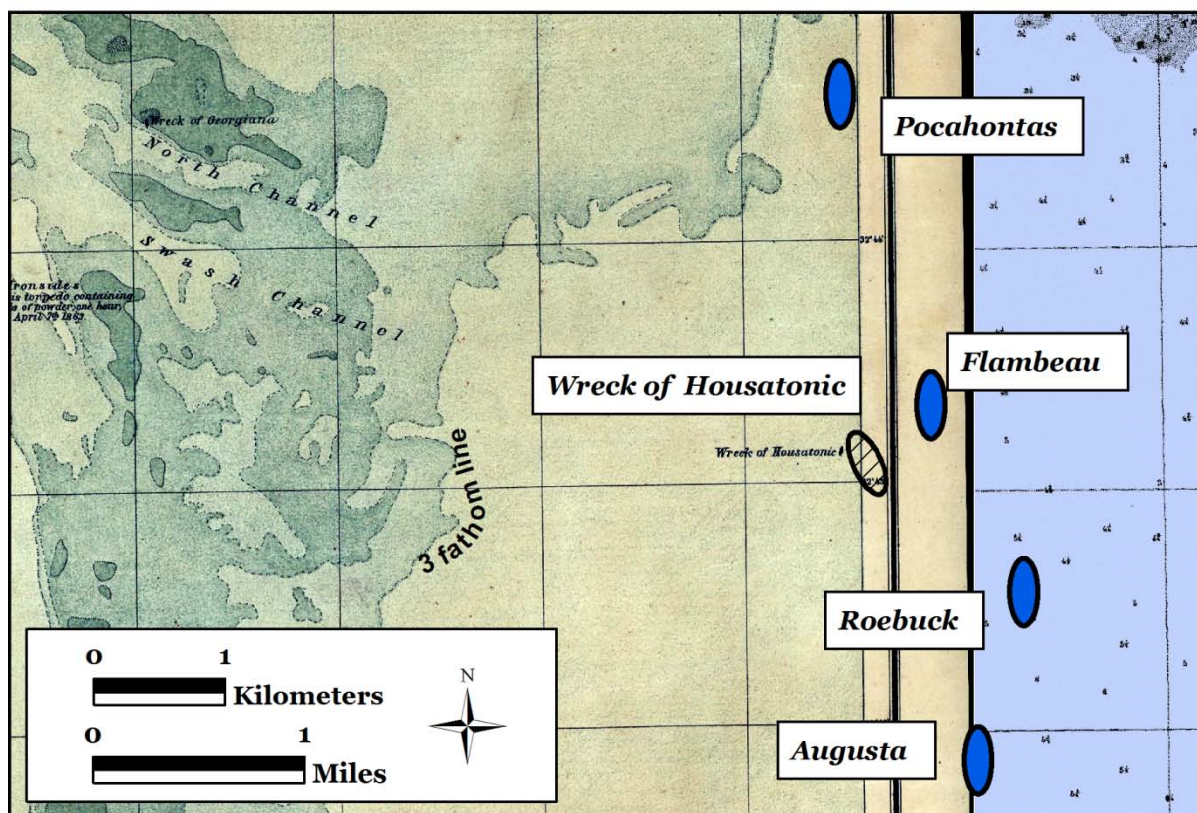
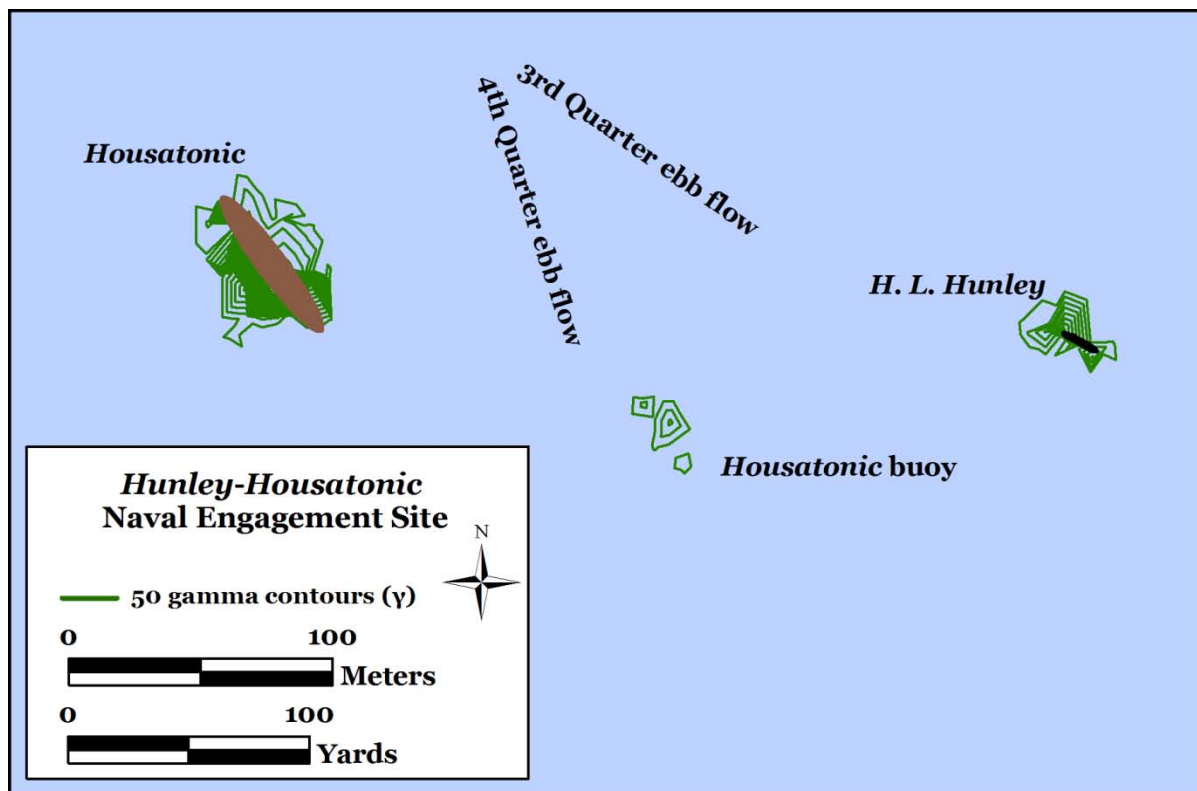


Figure 49: Top—Hunley-Housatonic naval engagement site; Bottom—Wreck of Housatonic in context to reported blockading stations on 11 May 1862 [Ships not in scale] (ORN, ser. 1, vol. 12:816; US Coast Survey 1865; SCIAA graphic).

A map accompanying a report by the senior naval officer off Charleston shows the disposition of the blockaders off Charleston Harbor on 11 May 1862 and serves to place the final resting place of the Union warship in context with the overall blockade strategy. Georeferencing this drawing to the georectified 1865 nautical chart revealed *Housatonic* was apparently stationed off the entrances of the Swash and North Channels the night of the attack. On 11 May 1862, *Flambeau* was on station here, with the responsibility of supporting the blockader closer inshore off Breach Inlet, in this case *Pocahontas*, and chasing any inward or outward bound blockade runners. Presumably, *Housatonic* was under the same general guidance in 1864. In fact, the testimony of *Housatonic*'s captain, Charles Pickering, stated he immediately thought a blockade runner was spotted, prior to learning he was the prey and not the hunter that night (NARA, Naval Court of Inquiry Case #4345, RG 45, M625).

The *H.L. Hunley* and USS *Housatonic* engagement site represents the third and most successful Confederate attempt to strike at the Union blockading fleet stationed off Charleston Harbor. The two other attempts comprised the ironclad sortie that temporarily disorganized the fleet in early 1863 and the semi-submersible *David* attack on USS *New Ironsides* in October 1863. While achieving Confederate aims to deliver blows to the blockaders, these efforts proved of no long-term consequence, as the fleet maintained their stations off the harbor. The remains of the two antagonists reflect the nature of the Union blockade of using wooden steam warships for the outer blockade and the innovative, if not desperate, manner in which the Confederates contested Union naval superiority off Charleston Harbor.

Raccoon

The side-wheeler steamer *Raccoon*, built originally to ply the North Sea, measured 201 feet long, 21.4 feet wide, with a 9 foot draft (Wise 1988:317). The vessel was operated by the Charleston firm of Frasier, Trenholm and Company and had made one successful trip into Charleston on 11 June 1863 from Nassau with a load of general merchandise and government freight (*The Charleston Mercury* 12 June 1863). On the night of 19 July 1863, while attempting to run into the harbor, again from Nassau, the vessel met with resistance and entered into a cat-and-mouse chase with the Union blockaders. In spite of surviving cannon fire from several blockaders, including a broadside by *New Ironsides*, the blockade runner struck upon Drunken Dick Shoal. Deeming the situation hopeless, passengers and crew abandoned and then set fire to the stranded steamer (*The Charleston Mercury* 21 July 1863; *ORN*, ser. 1, vol. 14:367). After the abandonment of Charleston Harbor by Confederate forces, the Union navy undertook a survey of the various blockade runners to determine whether any cargo of value remained in the wrecks. *Raccoon*, erroneously thought to have wrecked departing the harbor, was inspected and having been there for some time any remaining cargo was deemed worthless (*ORN*, ser. 1, vol. 16:354). After the Civil War, Benjamin Maillefert, apparently worked on the wreck, mentioning in his logbook that his wrecking flat, *Palmetto State*, had stuck on *Raccoon* in late 1874 (SCHC-Maillefert).

Archeological Investigations

To prepare for the survey the georeferenced 1865 nautical chart was overlaid onto modern nautical charts to determine the survey area. The location was pinpointed using this method and referenced to coordinates provided by Clive Cussler on his website (http://www.numa.net/expeditions/siege_of_charleston_expedition.html [18 March 2011]). Both coordinates placed the wreck site at a shoal area just southwest of the north jetty. At some point in preparing the 1865 nautical chart, the Union cartographer erroneously named the wreck the *Georgiana* instead of *Raccoon*.

On 24 April 2009, MRD conducted a magnetometer and side-scan sonar to relocate the remains of *Raccoon*. The search area was located on the south side of the North jetty (Figure 50). Consulting current nautical charts showed the blockade runner search area as part of a shoal that was exposed during low tide. Survey operations took place on a high tide with gentle seas. The survey area measured 235 m (771 ft) in length and 148 m (485 ft) in width. Survey lanes were spaced 15 m (49 ft) apart with a boat speed of 4-5 knots. A large magnetic anomaly was detected in the survey block. The magnetic anomaly had a 4,100 gamma amplitude and disturbed three lanes and a 2,939 sq. m. (3,515 sq. yd.) area. The longitudinal axis of the anomaly runs slightly northwest to southeast. Sonograms revealed the anomaly lay at a transitional area between large sand ripples and a smooth bottom. The wreck is buried, although a small, indistinct acoustic anomaly was detected barely protruding above the bottom. The longitudinal axis of the target appears to align properly to the wreck's axis as shown on the 1865 chart.

Ruby

The iron side paddle-wheel vessel was built in Scotland in 1854 and measured 177.4 feet in length, 17.1 feet in beam, and had an 8.3 foot draft. The vessel operated at first in the Gulf of Mexico and then in the Atlantic (Wise 1988:318). On 1 January 1862, US steam sloop *Tuscarora* described *Ruby*, which the commander believed intended to run the blockade, having just departed Madeira for Nassau. The vessel was an iron paddlewheel steamer, fore-and-aft schooner rig, no bowsprit, two smoke pipes, one standing forward and the other after the wheelhouses, a small house forward of the mainmast and aft of the foremast, and had a light hurricane deck between the paddleboxes, with steam drums on deck. The vessel was long, low and had great speed (*ORN*, ser. 1, vol. 2:3).

On the night of 10 June 1863, Union blockaders spotted a steamer they presumed running out of the harbor through Lawford Channel. Several Union vessels fired on the vessel but it managed to escape into the darkness. Actually, *Ruby* was running into the harbor from Maffitt's Channel and had apparently become confused by the lights on Folly Island and then run ashore at Lighthouse Inlet at 1 AM on the morning of the 11th. A large portion of the cargo was thrown overboard; the vessel set afire and blew up. As the captain and crew sought refuge on Morris Island they came under fire from cannons and small arms fire from Union batteries on Folly Island, presumably killing one man. The blockade runner carried general cargo and government property (*ORN*, ser. 1, vol. 14:252-254; Fremantle 1991:188; *The Charleston Mercury* 12 June 1863; *Charleston Daily Courier* 17 June 1863).

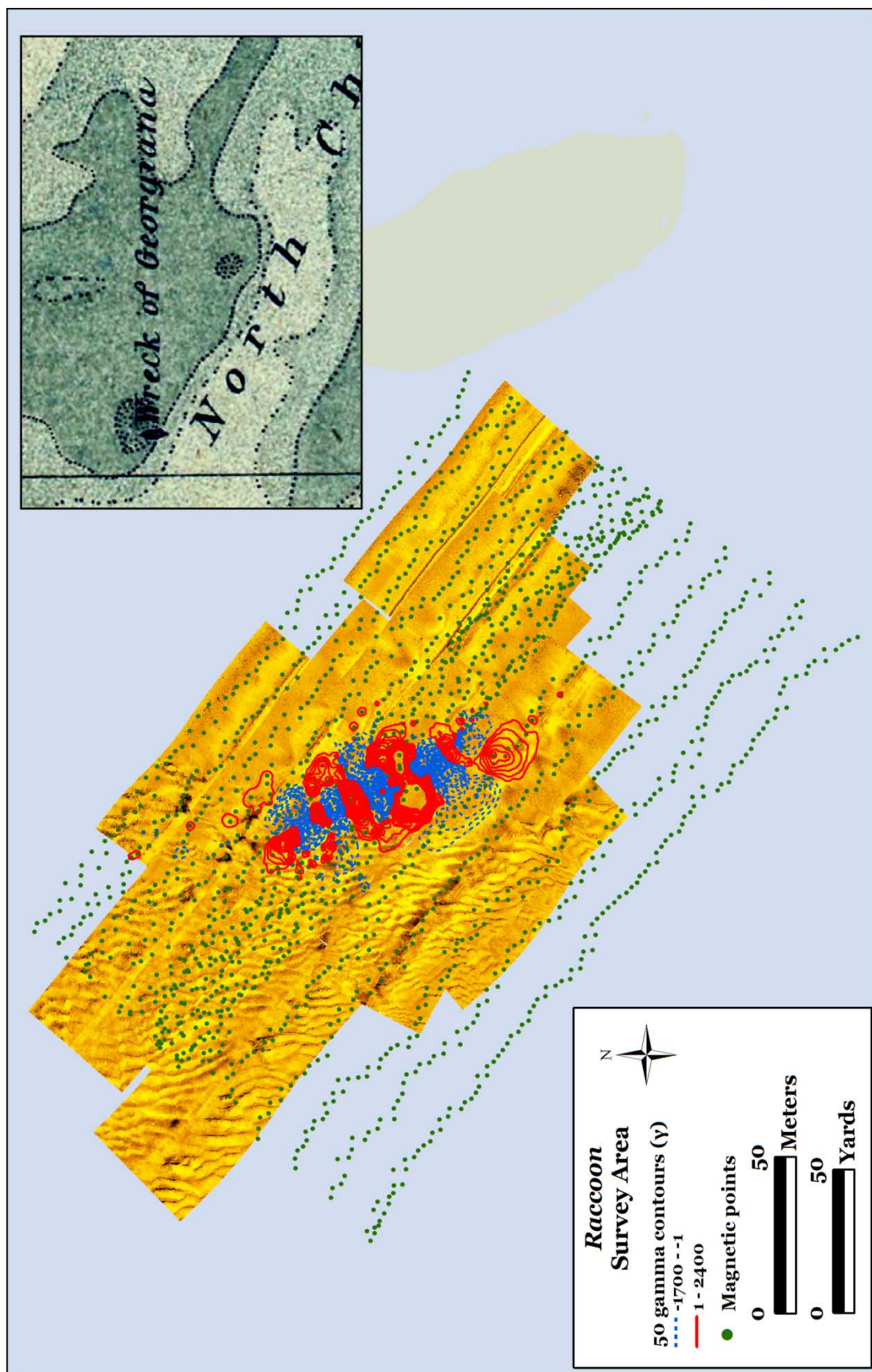


Figure 50: Magnetic contours overlaying sonogram of Racoon survey area. Inset—Position of Racoon misidentified on US Coast Survey 1865 chart (NOAA chart 11521, scale 1:20,000, 2010; SCIAA graphic).

The next morning, the Union blockaders discovered the large side-wheel steamer burning fore and aft on the north end of Folly Island. Boat crews from the Union vessels were sent to investigate the possibility of extinguishing the fires, salvaging the cargo, or pulling the vessel off the shore. As the small boats approached the wreck, Confederate batteries on the south end of Morris Island opened fire, forcing the crews to turn back. Shortly afterwards, a huge explosion occurred causing the mainmast to topple overboard. During low tide the vessel was high and dry, and during high tide waves broke over the wreck on the sea side, making any salvage attempts viable only from the landside by Army units (*ORN*, ser. 1, vol. 14:252-254; Fremantle 1991:188).

On 11 June, Brigadier General Israel Vogdes, in command of Federal troops on Folly Island, sent a couple of men aboard the steamer who stayed throughout the day. They were apparently spotted at sunset as the Confederates commenced firing into the wreck. The next day, 12 June, Vogdes led a battery of light field pieces to within two hundred yards of the blockade runner and shelled the wreck. This sparked an interchange between the Union and Confederate batteries. The Union battery retreated and then allowed the Confederates to plunder the wreck undisturbed (*ORA*, ser. 1, vol. 14 (part 1):319; *ORN*, ser. 1, vol. 14:252-254; Johnson 1890:84). The Union navy, however, spotted the Confederate wrecking parties and expressed a desire to destroy the vessel with assistance from the Army. Conferring with Vogdes, the navy learned that the army was busy erecting batteries in secrecy on Folly Island and did not want to expose these works to Confederate knowledge simply to blow up the *Ruby*. Vogdes, however, had no objections if the navy wanted to do the work (*ORN*, ser. 1, vol. 14:301-302). When the south end of Morris Island was taken on 10 July, Federal troops found the Confederate camps in disarray, as well as goods from the stranded blockade runner *Ruby* (*The New York Herald* 19 July 1863). Later, the blockade runner became a useful resource to the Federal army. While building the sand batteries, Gillmore ordered the men to obtain plates of sheet or boiler iron from the wreck of *Ruby* to use to line the embrasures of the batteries, including three at the Surf Battery (*ORA*, ser. 1, vol. 28, (part 1):27, 322). Apparently after the war, the blockade runner was offered for sale by the US Army Quartermaster's Department, most likely for salvage rights to recover any valuable metals and perhaps any remaining cargo (*The Charleston Daily News* 28 August 1867).

Archeological Investigations

In preparing for the search for *Ruby*, MRD consulted the *Map of Siege Operations Against the Defenses of Charleston Harbor 1863* that had the location of the blockade runner marked on the southeast side of a shoal at Lighthouse Inlet (US Army 1891:Plate 38). A section of the map containing the wreck was georeferenced to the georeferenced 1858 nautical chart. This generated a location of the wreck on the modern nautical charts. These coordinates were also compared with those provided by Clive Cussler on his webpage (http://www.numa.net/expeditions/siege_of_charleston_expedition.html [18 March 2011]). The two coordinates provided a general search area to locate the remains of *Ruby*.

A reconnaissance survey to locate the remains of *Ruby* at Lighthouse Inlet occurred on 13 October 2010. Breaking away from the First Stone Fleet survey to take advantage of calm seas and a high tide, MRD conducted several "wildcat lanes" along the northeastern

shore of Folly Island in an effort to locate the wreck (Figure 51). The area is characterized by shoals and breakers, and several rock groins extending from the beach into the ocean. Water depths in the survey area ranged from 0.6 m (2 ft) to 3.0 m (10 ft). Several magnetic anomalies were detected, but only one had the potential to signify the remains of the blockade runner. The magnetic anomaly had a 1,089 gamma amplitude, a duration of 35 seconds, and disturbed a 12,145 sq. m (14,525 sq. yd) area. No acoustic anomaly was detected in the area of the magnetic target. Bad weather the next day postponed deploying the sub-bottom profiler in an effort to determine the buried depth and length of the target. Additional work is needed to identify the anomaly, but the location, along with the size of the anomaly prove promising as marking the final resting place of *Ruby*.

Georgiana/Mary Bowers Shipwreck Complex

The *Georgiana* was built in the Glasgow, Scotland, shipyard of J.G. Lawrie and Company in 1862. The single screw iron-hull vessel measured 205 feet in length, 25 feet in width, 14 feet in draft, and 519 tons burthen. Reports stated the vessel was intended for military service or privateering upon reaching the Confederacy (Wise 1988:111-112, 302; Scharf 1887:802). En route to Charleston on its maiden voyage, the vessel stopped in Nassau, Bahamas, and loaded medicines, dry goods, and war material (*The Charleston Mercury* 20 March 1863). On the night of 18 March 1863, while slipping between a schooner and steamer off Dewees Inlet, Federal blockaders spotted the blockade runner in Maffitt's Channel and opened a heavy fire that crippled the vessel. According to reports, the captain had surrendered the vessel, but endeavored to get to deeper water in an attempt to escape. Finding the rudder head disabled, the vessel was instead driven into shallow waters approximately ¾-to-1 mile offshore of Long Island (Isle of Palms). Before abandoning the ship, the crew damaged all pipes to flood the hold, and then all those on board escaped in the boats to Long Island. Inspecting the vessel afterwards, Union sailors found several Whitworth and Blakely field artillery pieces and a large quantity of ammunition. Hopelessly stuck on the shoals, the Union navy set the vessel on fire with several explosions occurring as supposed gun powder ignited, causing the masts and rigging to fall. Confederate gunners at Battery Marshall opened fired on two Union launches, approximately 3.5-4 miles away, as they departed the wreck (*ORA*, ser. 1, vol. 14, no. 1:232). Reports in the *Charleston Courier* state that the captain of the vessel and several soldiers later set out to investigate the wreck but found several blockaders surrounding the wreck. Noticing the men on the beach and anticipating their intent, the Union ships opened fire and riddled the wreck, extinguishing Confederate hopes of salvaging the sunken vessel. Over the following days, Union crews salvaged various items from the wreck including Enfield rifles, bayonets, battle axes, sabers and other sundry goods (*ORN*, ser. 1, vol. 13:770-771; *The New South* 28 March 1863; *The Charleston Mercury* 20 March 1863).

On the night of 31 August 1864, *Mary Bowers*, a Scottish-built blockade runner, venturing to enter Charleston Harbor struck and stuck on the remains of *Georgiana*. The 226 feet long, 25 feet wide, 10.5 foot draft, 750-ton side-wheel steamer had made several blockading ventures prior to sinking off Long Island (Wise 1988:312). Recently departed from Bermuda, the vessel principally carried coal in the bunkers, hold, and on deck. The collision rendered a large opening in the hull's bottom causing the steamer to sink in a few

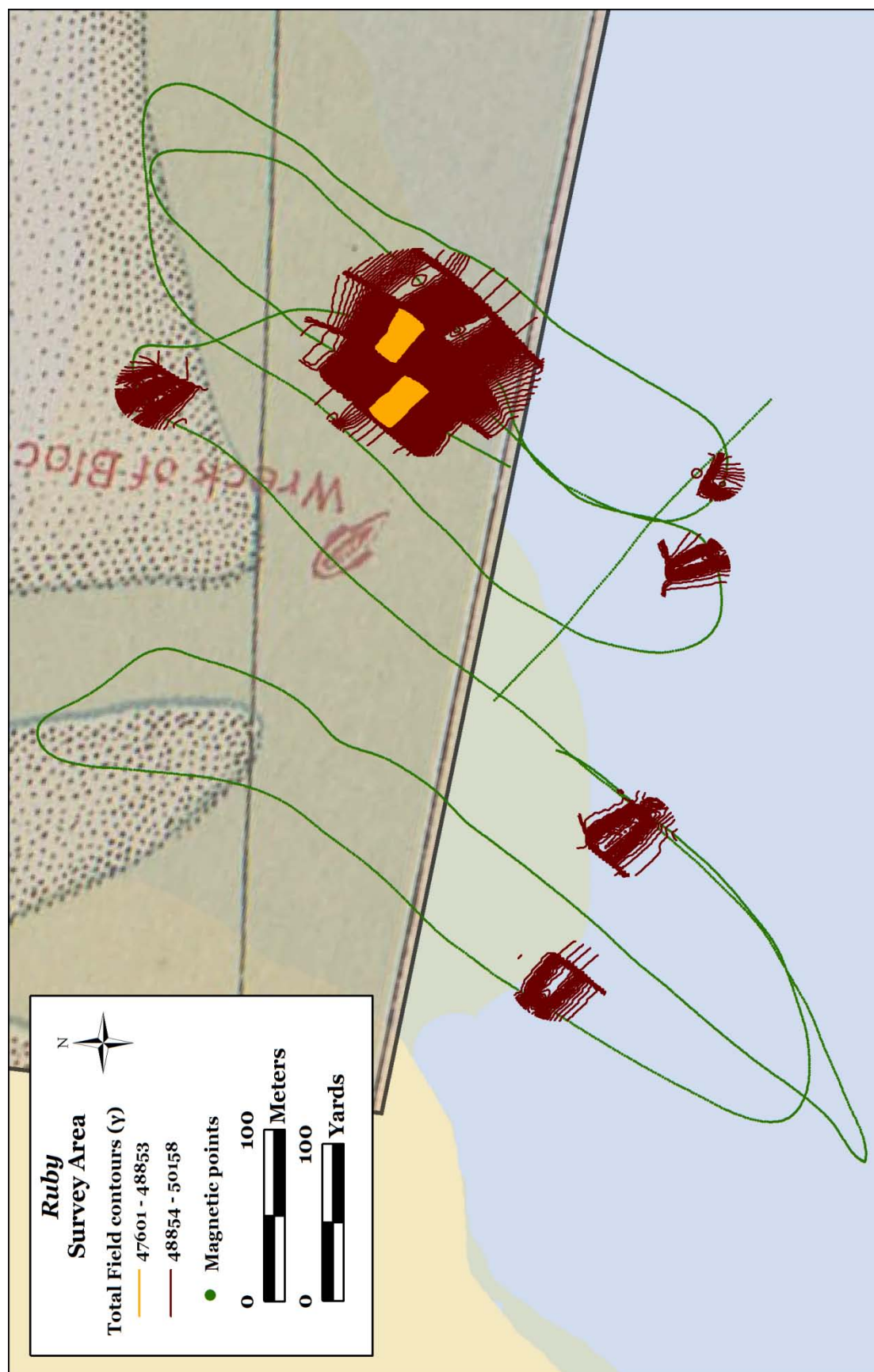


Figure 51: Magnetic contours overlaying Map of Siege Operations...1863 showing Ruby location (NOAA chart 11521, scale 1:20,000, 2010; SCIAA graphic).

moments (*The Charleston Mercury* 2 September 1864). The Union blockaders only discovered the shipwreck at daylight. Investigating the unknown shipwreck, Union sailors found a 16-year old boy aboard who told them he knew of no cargo other than coal, and that the steamer was to leave laden with cotton bound for Halifax, Canada. *Mary Bower's* officers, crew, and passengers had abandoned the wreck. The sailors removed several items from the shipwreck including a bell, binnacle, and several kedge anchors (*ORN*, ser. 1, vol. 15:658-659).

Post Wrecking History

The two sites were rediscovered in 1968 by E. Lee Spence, a local Charleston diver, who enlisted the aid of a shrimper to help him find the two blockade runners. Spence and a group of investors subsequently formed Shipwrecks, Incorporated to salvage the *Georgiana* and *Mary Bowers* wreck site. The finding and ensuing desire to salvage the wrecks spurred the first South Carolina legislation aimed at managing historic shipwrecks in state waters. The company obtained the first salvage license administered by the South Carolina Department of Archives and History in 1969, which agreed on a division of the artifacts: 25% for the state and 75% for the salvors (SCDAH salvage license #1 on file at MRD-SCIAA). The salvors found sections of *Georgiana's* hull standing over 2.7 m (9 ft) off the seafloor. Under the license, the company recovered numerous relics from the sites including Enfield rifles, bullets, Blakely shells, glass buttons, brass pins, and a variety of ceramics. They also recovered one Whitworth gun under the hull of *Mary Bowers* which rested atop *Georgiana* (Rooney 1980; Morris 1984:8-10, 15; Spence 1984:722-736). The company's salvage license was denied in 1973 due to their use of explosives to remove two concreted cannons from the wrecks (Record on file at MRD-SCIAA). Following the revocation of the salvage license, sport divers licensed under SCIAA's Hobby Diving program began visiting the site and recovered numerous artifacts including a number of Blakely shells, hundreds of shirt or collar pins, and thousands of buttons (Undated inventory on file at MRD-SCIAA).

Archeological Investigations

Initial MRD remote sensing investigation of the shipwrecks occurred on 8 August 2001 as part of the Naval Wreck Survey using funds from a Department of Defense Legacy Resource Management Program grant administered by the NHHHC. The remains of the vessels are approximately 1.6 km (1 mile) offshore of Isle of Palms. The shipwreck complex is marked on current NOAA nautical charts. The survey area measured 253 m (830 ft) in length and 233 m (764 ft.) in width using 15 m (49 ft) lane spacing, first going north to south and then east to west, at a boat speed of 4-5 knots (Figure 52). The crossing nature of the survey lanes allowed for gathering maximum magnetic data as well as thorough sonar coverage of the wrecks. The electronic data revealed a compact wreck site without much scatter of loose components. The magnetic anomaly had a 5,403 gamma amplitude and disturbed a 22,902 sq. m (27,399 sq. yd.) area. The magnetic signature, while complex, has its steepest gradient oriented linearly east to west between the positive to the south and negative to the north. Analysis of the sonograms revealed the two wrecks lying in a criss-cross pattern with *Georgiana* lying beneath *Mary Bowers*.

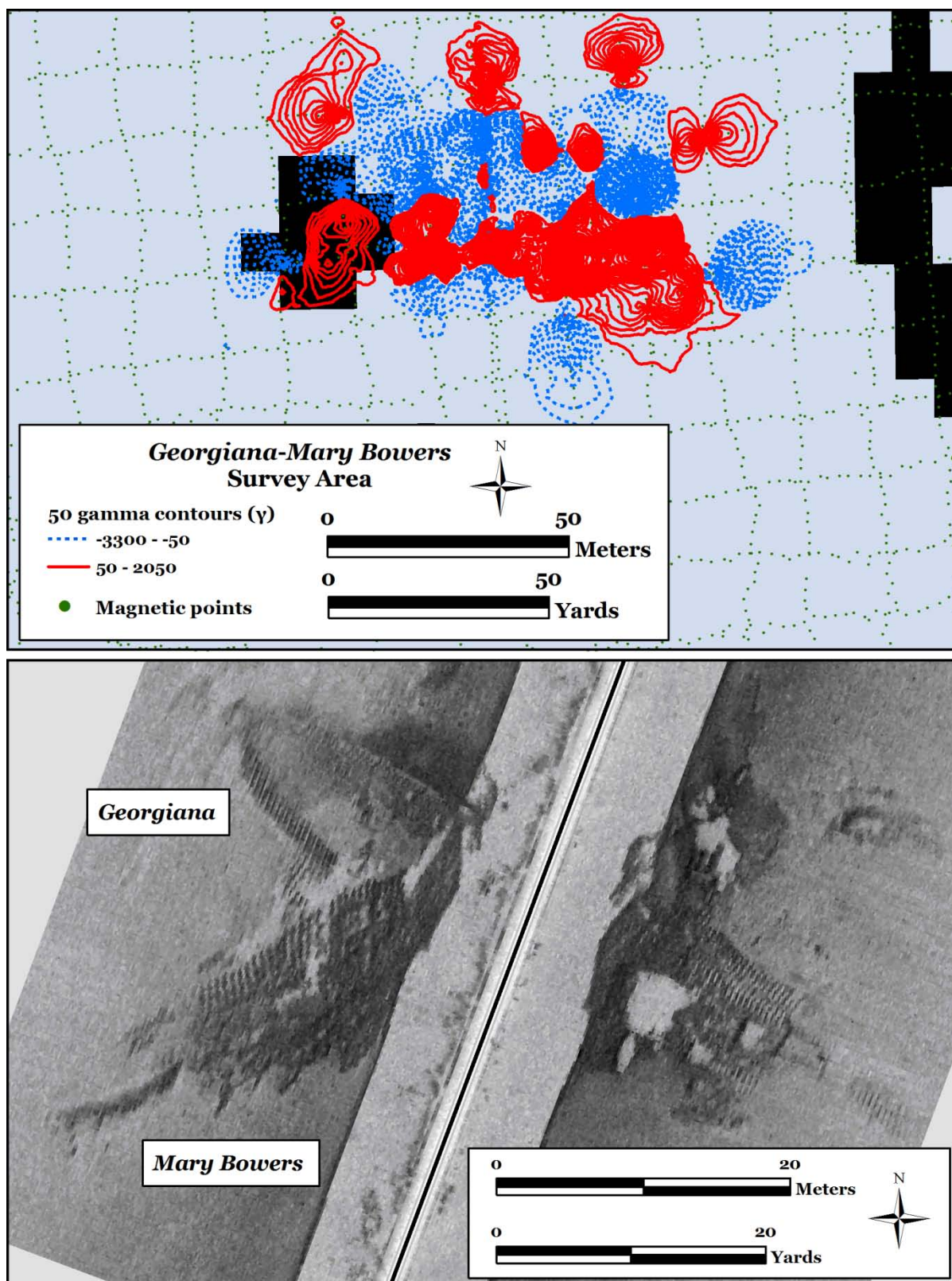


Figure 52: Top—Magnetic contours of Georgiana and Mary Bowers shipwreck complex (NOAA chart 11521, scale 1:20,000, 2010; SCIAA graphic); Bottom—Sonogram of the two shipwrecks (SCIAA graphic).

Prior to diving on the blockade runners in 2010 as part of the ABPP fieldwork, MRD obtained additional side-scan sonar data using the Humminbird unit. The longitudinal axis of *Georgiana* runs northwest to southeast, while *Mary Bowers* lies along a northeast to southwest axis. The intersection of the wrecks structure is confused, but their bow and stern areas are identifiable. *Georgiana*'s bow is the northwest end, and *Mary Bower*'s bow is the southwest end. *Georgiana*'s remaining length is 54 m (177 ft) and an extant width of 8.4 m (27.5 ft). *Mary Bower*'s extant length is 53 m (173 ft) and 9.2 m (30 ft) in width. The original lengths and breadths are different, mainly as a result of the deterioration of stern sections and collapsed nature of the sides of each vessel. The sonograms also revealed the frames of each vessel, along with a couple of boilers.

On 30 March and 1 April 2010, archeologists and volunteers dove on the remains of the two wrecked blockade runners. The objectives of the dives were to examine and to obtain underwater video of the wrecks. Depth of water was about 6.0 m (20 ft). Visibility at the bottom near the bows of the wrecks was poor, several inches at best, due to a constant surge and entrapment of fine sediments in this area. The forward area of both wrecks protruded above the bottom about 0.6-0.9 m (2-3 ft). Moving to the higher reaches of the wrecks, that is the boilers and the amidships starboard hull section of *Georgiana*, both of which ascended to a height of over 3.0 m (10 ft) above the bottom, improved visibility significantly. Inside the wreck, frames of both vessels were evident, with frame spacing of approximately 0.5 m (1.6 ft) in *Georgiana* and 0.6 m (2 ft) in *Mary Bowers*. At the overlap between the two wrecks, the *Mary Bowers* hull rested about 1.2 m (4 ft) or so above the bottom of *Georgiana*'s interior. No artifacts were encountered during the dives. Due to the limited time on the wreck the stern area of the wrecks were not investigated.

These two wrecked blockade runners attest to the presence of the Union blockade in this area of the battlefield. Their attempts to evade the blockaders to the north and to hug the friendly shore fell afoul of the dangers of this route, namely shallow waters, although *Georgiana*'s actions were precipitated by effective cannon fire. As noted above in the Second Stone Fleet section, while the remnants of the stone fleet were not found, the occurrence of these two shipwrecks at this location supports the belief that they are nearby. And while the Second Stone Fleet effectiveness as a deterrent to using the Maffitt's/Beach Channel to enter Charleston Harbor may have been marginal, the presence of the sunken vessels along with the floating vessels, made any voyage through the blockade at Charleston Harbor potentially disastrous.

Constance

The iron-hulled side-wheeler *Constance*, or *Constance Decima*, was built in Greenock, Scotland, in 1864. The vessel measured 201.4 feet in length, 20.1 feet in width, and had a draft of 9.4 feet (Wise 1988:294). Intelligence from the US consul in Halifax, Nova Scotia, informed Welles that *Constance* had departed that port with a valuable cargo, most likely bound for Wilmington, on 25 August 1864 and had returned to port by 12 September 1864 (ORN, ser. 1, vol. 10:406, 486). While attempting to enter Charleston Harbor at 12 o'clock in the evening of 6 October 1864, *Constance* struck the wreck of the *Mary Bowers* and sank in 5 minutes. One of the crew drowned and the rest reached the city

safely (*The Charleston Mercury* 7 October 1864). The next morning, USS *Wamsutta* reported a strange wreck lying near the wrecks of *Georgiana* and *Mary Bowers*. Casting anchor, the blockader investigated the wrecked vessel which had two smokestacks and masts, sidewheels, lying in three fathoms of water. The captain believed while attempting to enter the harbor the vessel struck the two wrecks lying nearby. As the hull of the vessel was completely submerged, nothing of the nature of the cargo could be discerned, although the captain believed divers could work to save the cargo. A day later intercepted Confederate dispatches identified the vessel as *Constance* (ORN, ser. 1, vol. 16:8-9).

Post Wrecking History

In 1970, E. Lee Spence, a local treasure hunter, relocated the blockade runner and obtained a salvage license. Spence found a section of the smokestack, the condenser, some brass valves, a hose nozzle, and the boilers. In 1973, excavations at the site to a depth of 1.8 m (6 ft) recovered a small brass bell, silver spoon, brass spike, a bosun's whistle, and other artifacts (License on file, MRD/SCIAA).

Archeological Investigations

Initial MRD remote sensing investigation of the remains occurred on 8 August 2001 as part of the Naval Wreck Survey using funds from a Department of Defense Legacy Resource Management Program grant administered by the NHHHC. The shipwreck lays approximately 2.2 km (1.3 mi) offshore and south of Isle of Palms and is marked but unspecified on current NOAA nautical charts. The survey area measured 283 m (309 yd) in length and 218 m (238 yd) in width using 15 m (16.4 yd) lane spacing, first going northwest to southeast and then approximately east to west, at a boat speed of 4-5 knots (Figure 53). The crossing nature of the survey lanes allowed for gathering maximum magnetic data as well as thorough sonar coverage of the wreck. The electronic data revealed a compact wreck site with some scatter of loose components. The magnetic anomaly had a 6,421 gamma amplitude and disturbed a 21,212 sq m (25,369 sq yd) area. Sonograms revealed a rectangular object measuring approximately 4.6 m (15.1 ft) by 6.6 m (21.6 ft) and indistinct wreckage.

Prior to diving on the blockade runner in 2010 as part of the ABPP fieldwork, additional side-scan sonar images were obtained using the Humminbird 997si Combo. The sonograms revealed three distinct sections of the wreck lying longitudinally along a northeast to southwest axis. The main and largest section of the wreck contained a boiler, sections of the hull, and various structural components on the southern area. Approximately 3 m (9.8 ft) to the north of this section was a boiler with a steam drum still attached. Moving northwards, another distinct low-lying section of the shipwreck protruded above the bottom about 11 m (36 ft) from the boiler. The overall distance between these sections was 29 m (95 ft). The exposed area of the wreck with the two boilers indicates the amidships area of the blockade runner. The magnetic signature extending beyond the visible remains signify that the bow and stern area are present but buried beneath the ocean floor.

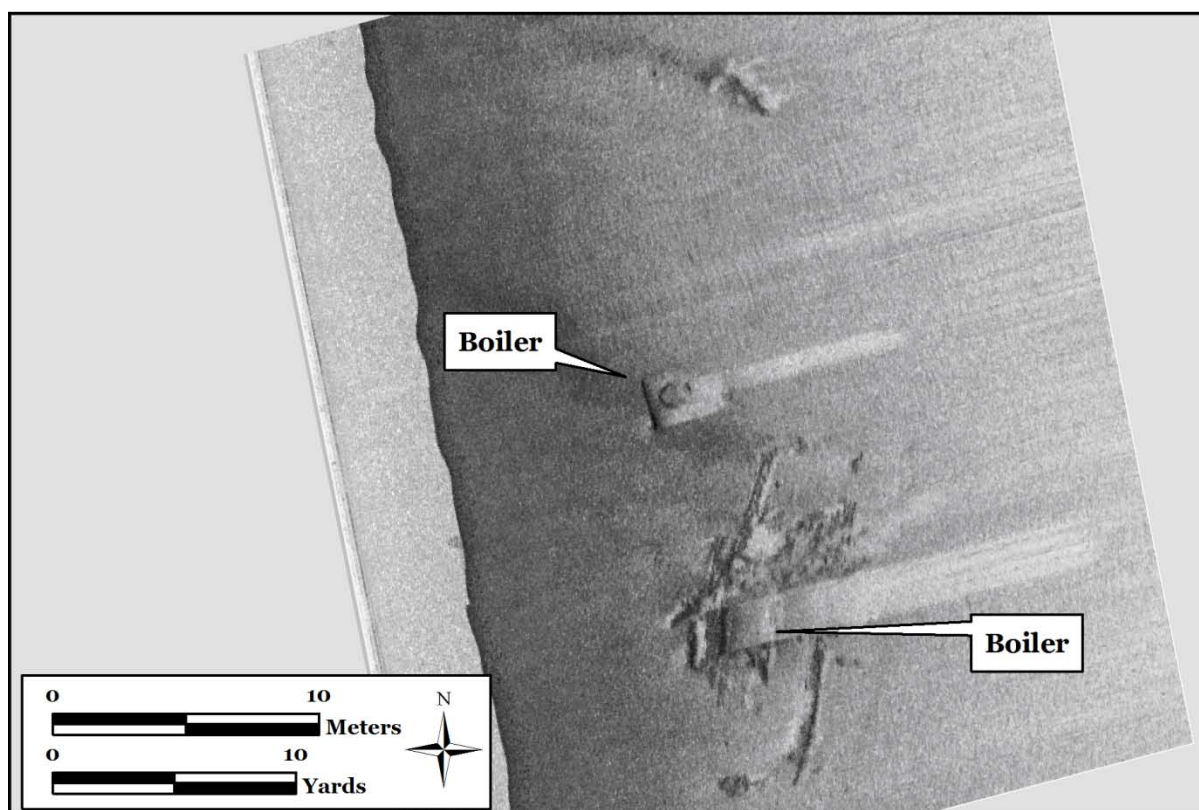
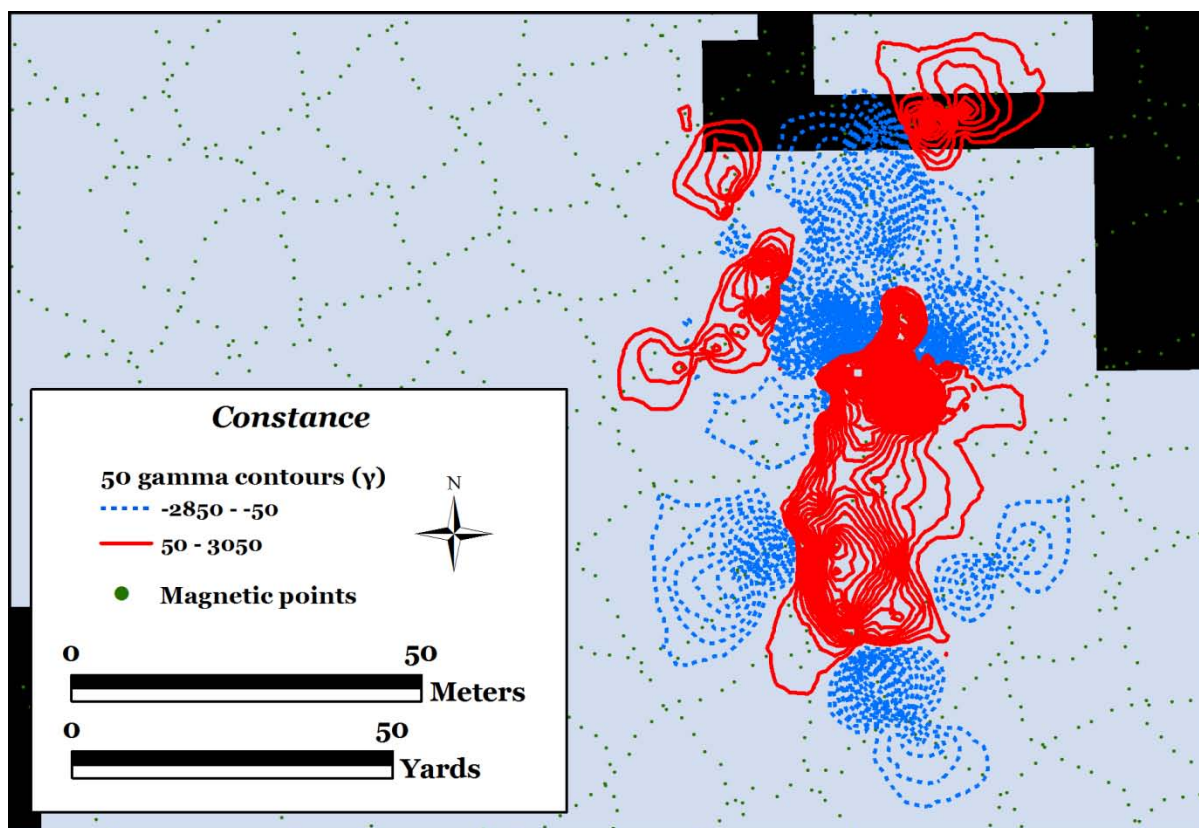


Figure 53: Top—Magnetic contours of Constance (NOAA chart 11521, scale 1:20,000, 2010; SCIAA graphic); Bottom—Sonogram of Constance (SCIAA graphic).

On 31 March 2010 and again on 22 April 2010, archeologists and volunteers dove on the remains of the blockade runner (Figure 54). The objectives of the dives were to examine and to obtain underwater video of the wreck. Depth of water at the site was approximately 4.7 m (14 ft), with the two boilers rising about 3.0 m (10 ft) off the sandy bottom. Visibility varied during the dives ranging from a 0.3 m (1 ft) to around 1.5 m (5 ft), although clarity atop the boilers was always good. Visual inspection of the southernmost and largest section of the wreck revealed sections of the hull, a jumble of various iron structural elements, and what appear to be the remains of the lower section of the smokestack. The boiler rises above all of the components. The boiler tubes on the north face of the boiler are visible, as well as from above through a hole where the steam drum once fit. A shrimp net was snagged on the western portion of this section. The boiler to the north was the same as the other one, but still had its steam drum attached. Moving to the isolated section to the north was either a section of the hull or remnants of the deck. No personal or cargo artifacts were encountered on the site.

Norseman

Norseman was a small screw-propeller steamer of about 49 tons that was schooner-rigged with three masts and a draft of 9 feet when loaded. Attracting notice in Liverpool, England, by the US consul in late February 1863, the vessel's suspected cargo was reported as a quantity of arms, shot, and other material once loaded in Nassau (*ORN*, ser. 1, vol. 13:754-755). En route to Nassau, the vessel was boarded by the US gunboat *Tioga* in late April or early May 1863. Finding the paper's correct, despite reluctance on the captain's part to produce them, the gunboat released the steamer to resume its voyage (*ORN*, ser. 1, vol. 2:199). Apparently successful in entering Charleston Harbor, exiting the harbor on the night of 19 May 1863 with a load of cotton proved disastrous as the steamer struck a submerged wreck, perhaps *Georgiana*, or an unknown snag, which tore a hole into the bottom of the hull. The steamer sank in about 15 minutes in 12 feet of water off Long Island (Isle of Palms). The cotton was floated to the beach and the officers and crew made it safely back to the city (*The Charleston Mercury* 22 May 1863). The vessel had also come under heavy firing by the blockaders on the northern line while endeavoring to run out. The vessel was found on the eastward side of Breach Inlet entirely submerged and a total wreck (*ORN*, ser. 1, vol. 14:207-208).

Archeological Investigations

Two sources of information were consulted to prepare to relocate the remains of *Norseman*. E. Lee Spence reported the shipwreck offshore and directly opposite 30th Avenue on the Isle of Palms. Coordinates obtained from Clive Cussler on his webpage corresponded favorably with the Spence information (http://www.numa.net/expeditions/siege_of_charleston_expedition.html [18 March 2011]). On 8 March 2010, MRD undertook a survey to locate the remains (Figure 55). The survey initially centered on the coordinates provided by Cussler. Finding only a small anomaly, 7.5 gammas, in that area, the survey lanes were lengthened and moved inwards to the beach. At the last safest lane along the beach at low tide, an anomaly was detected that had covered 114 linear meters (125 yd). Unfortunately,

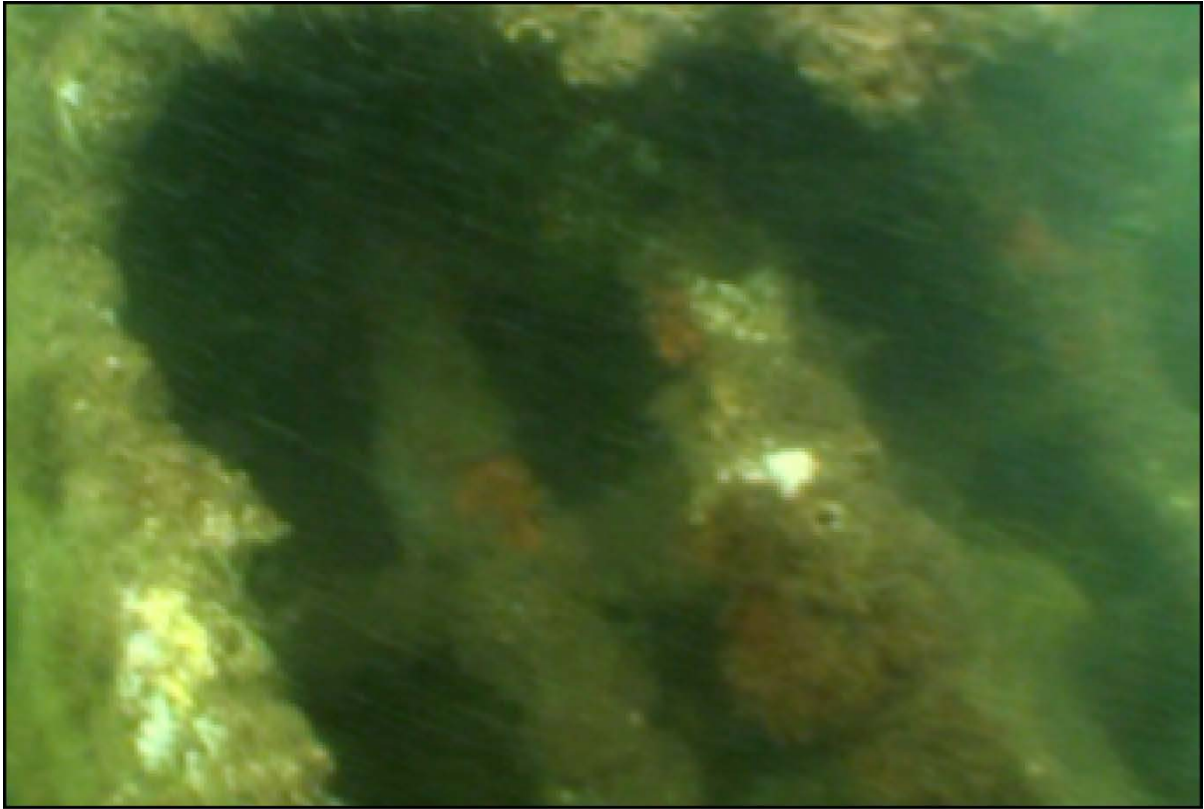


Figure 54: Constance underwater images. Top—Boiler fire tubes; Bottom—Base of boiler (C. Amer, SCIAA photos).

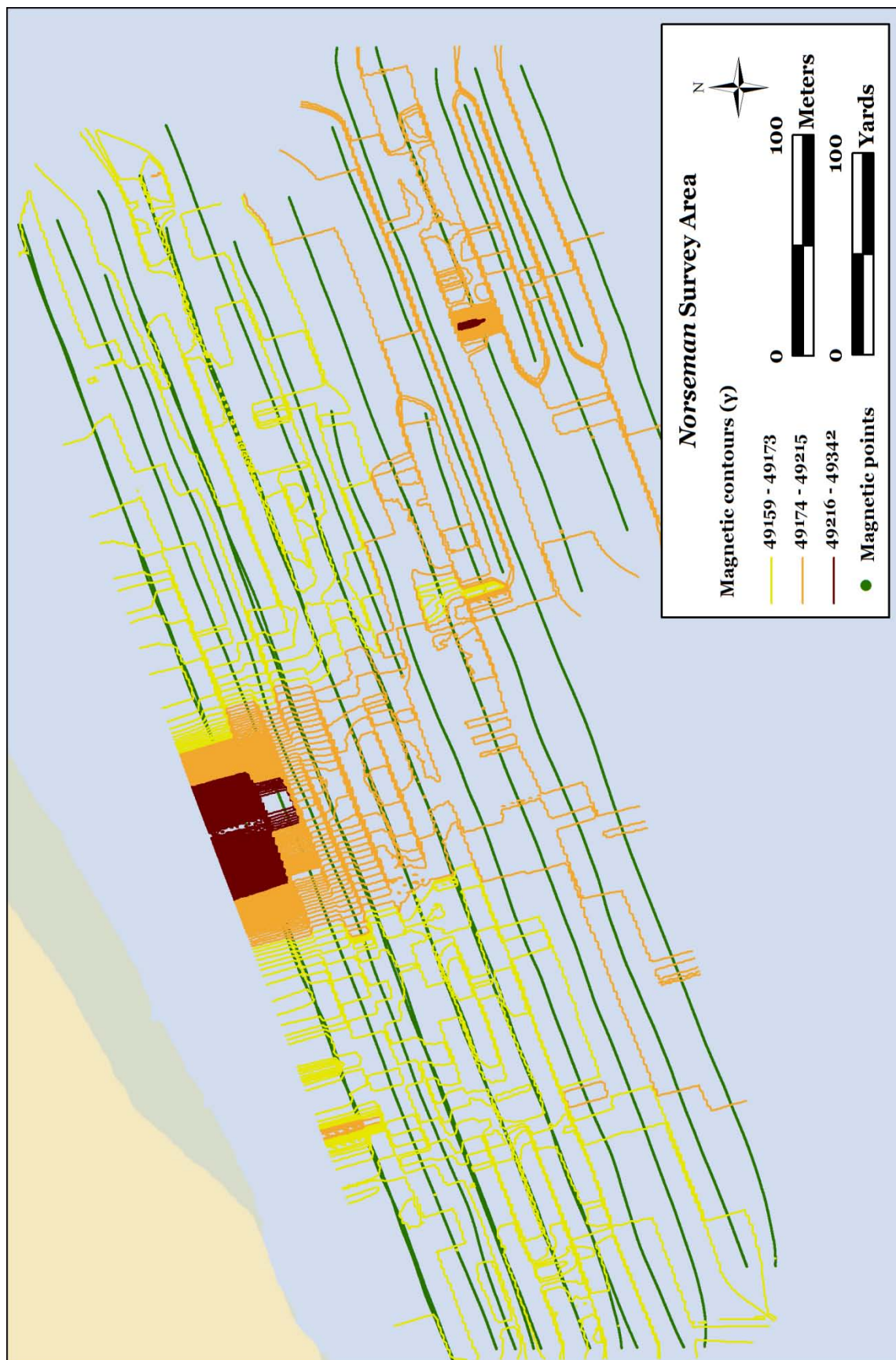


Figure 55: Magnetic contours of Norseman survey area (NOAA chart 11521, scale 1:20,000, 2010; SCIAA graphic).

waves and shallow water prevented the survey vessel from encroaching any further towards the beach to continue isolating the anomaly. Based on the position of the anomaly, and within the general area of the Spence and Cussler coordinates, the magnetics detected at this location mark the wreck of the blockade runner. Additional work with favorable tides and weather is necessary to precisely determine the exact location of the shipwreck.

Rattlesnake

The iron twin-screw blockade runner was built in London, England, in 1864. The vessel measured 201.8 feet in length, 24.4 feet in breadth, and had a 12.5 foot draft (Wise 1988:317). On the night of 3 February 1865 while entering Charleston Harbor, *Rattlesnake*, bound from Nassau, ran ashore on Long Island (Isle of Palms) and was abandoned and set on fire by its crew (*The Charleston Mercury* 4 February 1865). The next morning the blockaders *Wamsutta* and *Potomska* discovered a blockade runner ablaze and aground to the eastward of Breach Inlet. At 11 AM, several boats were found trying to access the wrecked steamer and the two blockaders shelled the men away. The iron-hulled vessel was completely gutted by the fire (*ORN*, ser. 1, vol. 16:216-217). Brigadier General William Taliaferro, CSA, on 8 February 1865 reported that a good deal of property remained on *Rattlesnake* and that the soldiers stationed nearby had been salvaging and secreting the property. He ordered a working party to salvage subsistence stores and turn these over to the commissary and to the quartermaster any other materials, especially brass and copper from the wreck. The party was also authorized to seize any property from the wreck found on unauthorized people (*ORA*, ser. 1, vol. 47 (part 2):1127). The Union navy examined several blockade runners after the fall of Charleston to determine if any cargo of value remained aboard. The report mentioned the wreck of *Rattlesnake*, lying near Breach Inlet, but that the wreck was in the surf zone and very difficult to work on and subsequently abandoned any planned salvage operations (*ORN*, ser. 1, vol. 16:354).

Archeological Investigations

On the 1865 nautical chart, two blockade runners are shown on the east side of Breach Inlet, with one near the beach of Long Island/Isle of Palms and the other further out in the shoals (Figure 56). The offshore one is presumed to be the blockade runner *Rattlesnake*. Using the georeferenced 1865 nautical chart, a location was obtained on the modern chart. The georeferenced location of the wreck fell within the intertidal zone. Coordinates obtained from Clive Cussler on his webpage (http://www.numa.net/expeditions/siege_of_charleston_expedition.html [18 March 2011]) corresponded favorably with MRD's georeferenced coordinates but were approximately 200 m (218 yd) out to sea. The modern nautical charts reveal the area of both coordinates is in very shallow water during low tide. Therefore, an attempt by sea and land was made to locate the blockade runner.

On 11 April 2009, Dr. Jonathan Leader, state archeologist, deployed the hand-held gradiometer in an attempt to locate the wreck site by land. Prior investigations at the nearby *Stonewall Jackson* site precluded visiting the site at an optimal tidal window. Dr. Leader arrived during a rising tide, and rough seas prevented access to the shallow water site.



Figure 56: Top—Rattlesnake and Stonewall Jackson shipwrecks on Isle of Palms (Google Earth image). Inset—1865 nautical chart; Bottom—Stonewall Jackson search area with volunteer and gradiometer (SCIAA photo).

Project and weather constraints precluded using the survey boat to locate the wreck. Future land investigations during low tide, or on a favorable high tide and calm seas for boat survey, should determine the precise location of the blockade runner.

Stonewall Jackson (Leopard)

The iron side-wheeler was built in Scotland in 1857 and measured 222 feet in length, 27 feet in depth, and had a draft of 14.6 feet. Originally named the *Leopard*, the vessel was purchased by the Fraser, Trenholm and Company in 1862 and renamed *Stonewall Jackson* in 1863 (Wise 1988:308). The blockade runner was described by an Union navy commander as an iron side-wheeler, having two masts with a great rake, and a raking smokestack, straight stern and a cutwater, and no head booms, and fast (*ORN*, ser. 1, vol. 1:413). The steamer had one close call when fired upon by the Union blockader *America* when exiting the harbor in late August 1862 after successfully delivering arms, powder, and other cargo into the port (*ORN*, ser. 1, vol.13:304). On the night of 11 April 1863 while attempting to enter Charleston Harbor at around 11 PM in the evening, *Stonewall Jackson*, bound from Nassau and loaded with several pieces of field artillery, 200 barrels of saltpeter, 40,000 army shoes and a large assortment of other goods, found itself surrounded by Union blockaders. *Stonewall Jackson* succeeded in slipping past four blockaders stationed around Rattlesnake Shoal despite their firing upon the vessel. During the half-hour chase the blockade runner was under constant barrage and suffered three to four shots through its hull. *Stonewall Jackson's* captain, finding the situation hopeless, headed to Long Island (Isle of Palms) and ran the steamer ashore. The beached vessel was then set afire under the captain's orders and everything destroyed except the iron hull. The officers, crew, and passenger totaling 54 made it safely to the city. The commanding officer of Battery Marshall at the north end of Sullivan's Island bemoaned the crew firing the vessel as it lay under his guns protection (*The Charleston Mercury* 13 April 1863; *ORN*, ser. 1, vol. 14:126-127).

Archeological Investigations

During Cussler's 1981 expedition search for the *H.L. Hunley* and other related shipwrecks in Charleston, they uncovered the buried remains of *Stonewall Jackson* on the Isle of Palms. A Schonstedt hand-held gradiometer was used to demarcate the blockade runner under the beach. A back-hoe operator dug into the sand approximately 3-6 m (10-20 ft) deep, and then a hydro-probe was utilized that made contact an additional 4.5 m (15 ft) before striking solid objects. The wreck was buried 7.6-10.6 m (25-35 ft) under the beach. A rising tide precluded detailed examination of the findings other than confirming the presence of a shipwreck, most likely *Stonewall Jackson* (Browning and West 1984; Goodwin 1981:53).

As mentioned in the *Rattlesnake* section above, the 1865 nautical chart depicts two blockade runners on the east side of Breach Inlet, with one near the beach of Long Island/Isle of Palms and the other further out in the shoals (See Figure 56). The shipwreck inshore is presumed to represent the blockade runner *Stonewall Jackson*. Using the georeferenced 1865 nautical chart, a location was obtained on the modern chart. The georeferenced location of

the wreck was situated on the beach. Two other sources of information were consulted to prepare to relocate the remains of *Stonewall Jackson*. Coordinates obtained from Clive Cussler on his webpage (http://www.numa.net/expeditions/siege_of_charleston_expedition.html [18 March 2011]) corresponded favorably with MRD's georeferenced coordinates, although the georeferenced location seemed too far inland, therefore Cussler's coordinates were given precedence. A photograph of the 1981 excavation at the site reveals the shipwreck close to the ocean (Goodwin 1981:52). In the current landscape the Cussler coordinates position the wreck in the first dune line back from the ocean, a sign of accretion since the early 1980s, and underneath a beach access path. The site is located directly off 5th Avenue. According to Spence, a shipwreck in this area was visible in the surf in the late 1960s (Spence 1984:638).

On 11 April 2009, Dr. Jonathan Leader, state archeologist, deployed the hand-held gradiometer in an attempt to relocate the remains of the blockade runner (See Figure 56). A 14 m by 18 m (15.3 by 19.7 yd) grid over the site guided the survey operation. The gradiometer detected a large anomaly ranging from 3,056-4,456 gammas, and then beyond the detection threshold. The large magnetic anomaly is a positive indication that the remains of the blockade runner were re-located and positioned for future investigations.

Inner Blockade

USS Weehawken

Weehawken was a *Passaic*-class monitor launched on 5 November 1862 in Jersey City, New Jersey, and commissioned on 18 January 1863 under the command of Captain John Rodgers. The 1,875-ton, single-turreted, single-screw monitor measured in overall length 200 feet, overall beam 46 feet, and a draft of 10.5 feet. *Weehawken* was armed with one 15-inch Dahlgren smoothbore and one 11-inch Dahlgren smoothbore. The monitor was ordered to the South Atlantic Blockading Squadron and arrived at Port Royal on 5 February 1863 (*DANFS*).

On 7 April 1863, *Weehawken* led the Federal ironclad assault column as a result of the captain agreeing to push the torpedo raft ahead of the advancing fleet. After a delay of over an hour due to one of the raft's grappling hooks entangling its anchor chain, *Weehawken* slowly steamed towards the harbor entrance. The raft proved troublesome and caused problems in steering the monitor. Reportedly, a torpedo exploded under or near the monitor, slightly lifting it, but causing no discernible damage to the hull. At around 2:50 PM, *Weehawken* received the first shots from Fort Moultrie. Extremely accurate fire on part of the Confederates struck the vessel at least 53 times, causing the side armor in one place to splinter, a hole in the weather deck, and deranging the turret briefly. A great impact right above his head injured the pilot but the rest of the monitor's crew escaped with no injuries. *Weehawken* fired 26 times at Fort Sumter (*ORN*, ser. 1, vol. 14:11-13; 27).

In mid-June 1863, Du Pont ordered the monitors *Weehawken* and *Nahant* to maintain the inside blockade at Wassaw Sound, Georgia, in anticipation of a Confederate ironclad

sortie out of Savannah. On the morning of 17 June, *Weehawken* accompanied by *Nahant* engaged the ironclad CSS *Atlanta*, armed with two 7-inch and two 6.4-inch Brooke guns, as the warship descended from the Wilmington River into the sound. *Weehawken* fired five shots, with four of them striking and penetrating the armor and killing and wounding the gun crew, destroying the pilot house, and injuring a couple of the pilots aboard the Confederate vessel. The Confederate ironclad managed to fire six rounds before grounding and then surrendering. The captured vessel was brought to Port Royal. During the battle as both Union craft descended on the stricken Confederate ironclad, *Nahant* collided into *Weehawken* causing damage to the overhang and sheer-strake of that vessel (*ORN*, ser.1, vol. 15:263-270).

Weehawken participated in bombarding the Confederate defenses on the south end of Morris Island during the successful Federal assault there on 10 July 1863. Following the capture of the southern end of the island, the monitor battered away at Battery Wagner prior to the failed 18 July Federal assault. *Weehawken* remained active off Morris Island pouring fire into Batteries Wagner and Gregg on the north end of the island until the Confederates abandoned the island on the night of 6 September 1863 (*ORN*, ser. 1, vol. 14:591, 595-596).

Finding Battery Wagner and Battery Gregg deserted by Confederate forces on the night of 6 September 1863, Dahlgren sent a message to General Beauregard to surrender Fort Sumter, now deemed indefensible by the besieging Union military forces. Beauregard replied in the negative with "Come and take it." Dahlgren then set in motion a plan to take the fort by ordering *Weehawken* on 7 September to mark and navigate a channel on the southwest side and cut off communications from that quarter to the fort. The monitor grounded and remained fast on the bar south of the fort and remained there until 9 September. On the morning of 8 September, Fort Moultrie noticed the stranded monitor, with an exposed port overhang and started firing, aiming to hit below the waterline. As soon as the Confederate fort fired, *Weehawken* responded with its 15-inch gun and on the second shot hit and exploded a magazine, silencing the fort for some time, and directed a few shots at Fort Sumter. *New Ironsides* and the other monitors then began to steam into the harbor throat intending to pass the obstructions when the Sullivan's Island batteries opened fire on the flotilla. The Union ironclads responded with a fierce fire on Fort Moultrie, Battery Bee, and Battery Beauregard. During the engagement *Weehawken* received twenty-four hits inflicting minor damage, except one shot to the turret that injured several crewmembers and another shot causing a 7-inch hole in the hull that leaked until plugged. The monitor fired 82 rounds during this fray (*ORN*, ser. 1, vol. 15:549-557).

Shortly after this engagement *Weehawken* was sent to Port Royal to clean the bottom and general maintenance, including repairs to the damage at the bow, perhaps caused when pushing the torpedo raft on 7 April 1863 (*ORN*, ser. 1, vol. 15:109; vol. 14:43-44). A correspondent from the *New York Times* visited the machine shop at Station Creek, Port Royal, and found *Patapsco* and *Weehawken* undergoing repairs for various battle damages. The reporter noted the workers installing a 15-inch high and five-inch thick collar at the intersection of the deck and turret, a modification to prevent fragments of shot or shell from jamming the turret, which had occurred during the shootout on 8 September. He was also

shown the hole that was still trickling water and required frequent use of the pumps to discharge the water (*New York Times* 14 October 1863).

The repaired vessel returned to its station off Charleston later that fall. While on picket duty on 29 November, the monitor noticed a large crew of men working on Fort Beauregard on Sullivan's Island. The monitor fired several ricochet shells among the group causing a suspension in work and followed that up by firing twenty shells at Fort Sumter. Ever concerned with the obstructions at the harbor throat, the monitor reported the presence of forty-three buoys on the obstructions (*ORN*, ser. 1, vol. 15:141).

At noon on 6 December 1863, while riding out a gale in the Main Ship Channel, *Weehawken* began taking in water in the windlass room at the bow. Pumps were started and water started discharging out of the monitor. Apparently, the crew felt no apprehension, but suddenly the water rose and the vessel tilted severely forward. A signal of distress was made for assistance but the vessel sank about five minutes later in 30 ft. of water at 2:45 PM. Despite the immediate arrival of small boats to assist the survivors, thirty-eight men lost their lives (*The New York Times* 14 December 1863; *The New York Herald* 12 December 1863). In addition to losing the men aboard the monitor, the ship's pet chanticleer, Chapman, also perished, having shared the same perilous duties as the crew. As remembered by a crew member years afterward, "If he had been killed in one of them long bombardments, I shouldn't have felt so bad...but to see him fluttering on the waves and going down like a mere land-lubber..." (Cowley 1879:118). Only the smokestack protruded above the surface, although during low tide the pilot house was awash by a foot. Dahlgren immediately sent for the divers at Port Royal to try and raise the sunken ironclad. Divers inspected the sunken monitor a few days later, especially focusing at the junction of the overhang and the hull at the bow to check for any separation of the two, a supposed cause of the sinking. The divers found no evidence of separation between the two structural elements (*ORN*, ser. 1, vol. 15:162; 165-166; NARA, RG45, M625, Reel 208). Plans were made to raise the wreck, and by 7 January 1864, Dahlgren believed the operations to raise the ironclad were not being pursued vigorously enough during smooth water, and later in the month the salvage agent stated their intent to build a wooden cofferdam to pump the water from above and out of the vessel. Apparently, the salvage effort was not pursued to raise the sunken monitor (*ORN*, ser. 1, vol. 15:225; 239).

A court of inquiry to ascertain the facts of the sinking determined several contributing factors to the disaster, particularly having recently received a large load of ammunition that was stowed forward, although efforts were made to right the vessel by rolling the shot aft as the vessel sank forward. Compounding these factors was the entry of the water at the hawse pipe, the windlass hatch, at the plank-sheer, and a large amount of water entering through the 11-inch gun port and down the hatch into the berth deck (*ORN*, ser. 1., vol. 15:167-168). After the inquiry, Dahlgren wrote an accompanying opinion stating that the ammunition had no bearing in the sinking, that it was completely a result of the large influx of water through the openings. While the pumps drew the water out, the engineer stated at times, it was sucking air as it ran out of water. This was apparently caused by the small aperture of the limber holes (6 inches by 4 inches) between the floors at and beyond the chain locker that restricted the flow of water aft. The rapid amount of water into the hull and the constricted

water flow all contributed to the demise of the monitor according to Dahlgren (*ORN*, ser. 1, vol. 15:168-169).

Post Wrecking History

Efforts to refloat *Weehawken* continued after the war for a three year period. A newspaper article reported that the apparatus designed to raise the monitor had been destroyed during stormy weather and that work had been suspended in 1868. Failing in its efforts to raise the monitor, the principals of the salvage group formed the Monitor Wrecking Company, and obtained an award by the US Treasury Department to salvage *Weehawken* and other shipwrecks from the harbor in 1870 (*The Charleston Daily News* 7 September 1868, 8 January 1870). Salvage of the *Weehawken* undertaken by the company had removed by 1871 the machinery, and iron from the turrets and deck. Company divers reported "Her interior is all filled with mud and garbage, among which human bones are here and there visible." Approximately 200 tons of iron and various metals were raised from the wreck (*The Charleston Daily News* 21 June 1871). Later in the year, *The New York Herald* reported the arrival of human bones, believed to be those of the four engineers recently recovered by divers in the *Weehawken* engine room, to the Brooklyn Navy Yard for interment (*The Charleston Daily News* 27 September 1871). On 26 September 1871 a funeral was held with military honors in a driving rain for the recovered remains of the four engineers lost on *Weehawken*. The box of bones was 2 feet long, 8 inches wide, and 12 inches deep and placed in a rosewood coffin and buried at the Brooklyn Naval Hospital Cemetery (*New York Daily Tribune* 27 September 1871). Apparently in the mid-1920s, the bodies of all or most of the navy sailors and family members in the naval hospital cemetery were disinterred and removed to Cypress Hill National Cemetery in Brooklyn (<http://www.thelmagazine.com/TheMeasure/archives/2010/11/03/what-to-do-with-that-old-cemetery-in-south-williamsburg> [22 April 2012]). A phone conversation with staff at the cemetery failed to find any mention or location of the re-burial plot of the *Weehawken* crew.

During the early 1870s, a survey of the harbor found *Weehawken* had been heavily blasted to a depth of 11 ½ feet below the surface of the water. The engines had been removed and pieces of the turret, composed of 12-inch iron, and the pilothouse, composed of 10-inch iron, were lying inside the hold of the vessel along with the boilers. The sand was banked up on both sides of the wreck. Aft of the wreck the bottom had been cut out for a distance of 40 feet, and the stern, pointed to the west, had broken off and fallen but was still attached to the remainder of the wreck by the lower parts. The surveyor suggested that the wreck should be, as nearly as possible, removed (USACE 1871:581). A contract was entered with Benjamin Maillefert on 20 September 1872 to remove *Weehawken* and by 1873 the wreck was removed to a depth of 20 ft. at low water (USACE 1873a:727-728). Judging from the numerous entries in his salvage logs, it could be assumed that most of the wreck was carted away as scrap metal for auction (SCHS-Maillefert).

Archeological Investigations

Initial MRD remote sensing investigation of the remains occurred in 2001 using funds from a Department of Defense Legacy Resource Management Program grant administered by the Naval Historical Center. The MRD conducted a remote sensing survey of the site on 6 August 2001 (Figure 57). Realizing from our experience on the *Patapsco* and *Keokuk* that the 1870 coordinates would be erroneous, MRD centered the survey block over Wilbanks' coordinates (NUMA 2001), after first verifying the presence of the wreck with a magnetometer pass over the coordinates. A 434-meter by 270-meter (474-295 yd) block was set up with the long axis in a NNW-SSE orientation to take advantage of the current, which ebbed and flowed in those directions. Using 15-meter (16.4 yd) spacing, 19 lanes running along the long axis were surveyed using concurrent magnetometer/side-scan sonar operation. Fifteen lanes were set up crossing the site in an ENE-WSW orientation to refine the magnetic contours.

Figure 57 depicts the magnetic contours of the site using a 100-gamma contour. The area of magnetic influence covers approximately 29,000 square meters (34,684 sq yd), although the nodes having the greatest gamma readings cover less than one-quarter of that area. Six nodes of high magnetic intensity are aligned in two parallel rows along a NW-SE axis covering a distance of approximately 65 meters (71 yd) NW-SE and approximately 60 meters (65.6 yd) NE-SW. The nodes range from approximately 500 to 1000 gammas, while the highest reading, -1,867, occurs along the east side of the site. The main cluster of magnetic nodes is surrounded by a number of smaller anomalies in the 100 to 300-gamma ranges that are scattered around the fringes of the site. The maximum duration of magnetic influence at 1 gamma along both NW-SE and NE-SW axis is 76 seconds representing an approximate distance of 170 meters (180 yd). The acoustic record of the survey block gave no indications of cultural material that may be associated with *Weehawken* and presented a relatively smooth featureless bottom. The center of magnetic disturbance occurs in approximately 4.3 meters (14 feet) of water.

The absence of any acoustic images of the wreck confirms that *Weehawken* is buried beneath the sediments. Based on bathymetric data recorded during the survey, the wreck lies in approximately 4.3 m (14 ft) of water. Probing by Cussler in 1981 determined portions of the wreck buried approximately 2.4 m (8 ft) below the bottom (Browning and West 1984), while the 2001 NUMA survey indicates a depth of 3.6 m (12 ft) of sediment lie over the site (NUMA 2001:4). From contemporary reports, the vessel sank across the channel in 30 feet of water. Given the discrepancy in contemporary and modern water depths over the site it appears that a significant amount of accretion has occurred over the site in the intervening years, primarily influenced by the presence of the south jetty.

In 1873, the sunken remains of *Weehawken* were partially salvaged by Dr. Benjamin Maillefert. Dr. Maillefert removed the decking and upper hull down to a depth of 20 feet at low water, recovering the engines, both Dahlgren guns, portions of the turret and pilothouse. He also removed a 40-foot section of the 844-ton monitor's stern (USACE 1874a). The location and clustering of the anomalies suggests that the site was dispersed, probably not only during the salvage process but through later intervention by environmental forces. The orientation of the high magnetic intensity anomalies suggests that a significant portion of the

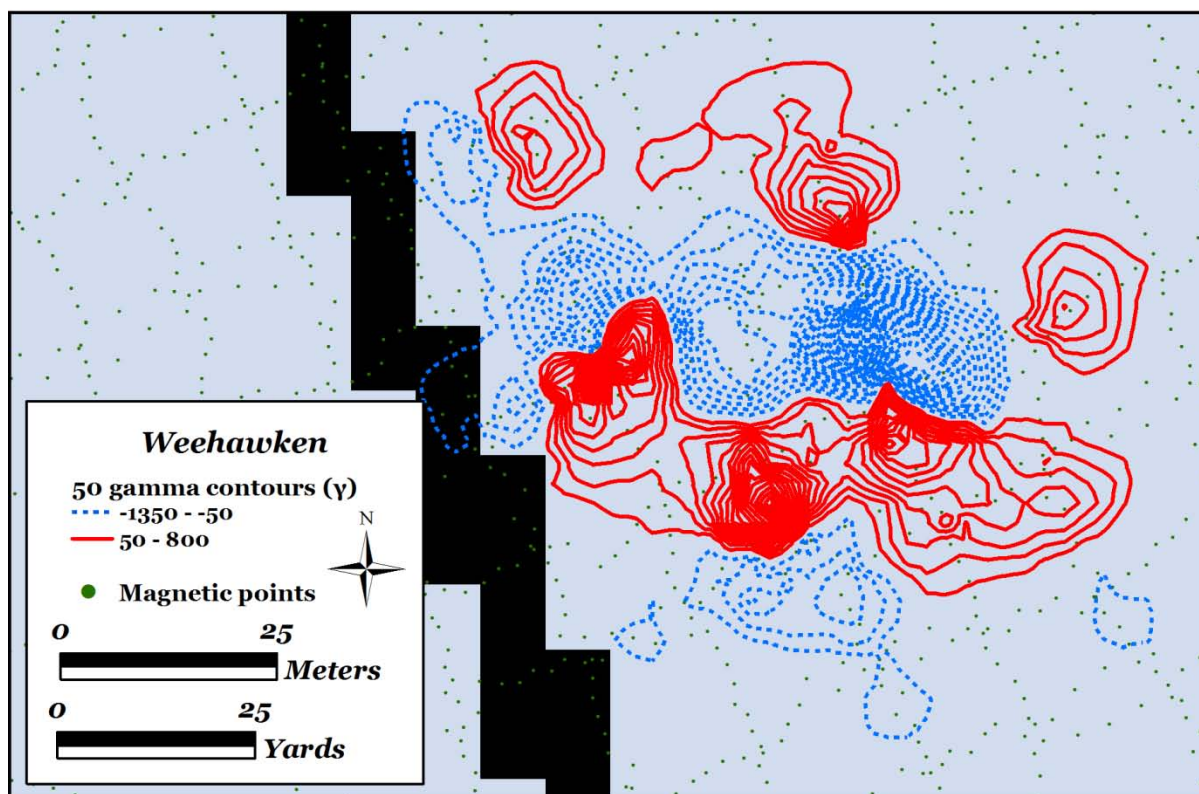
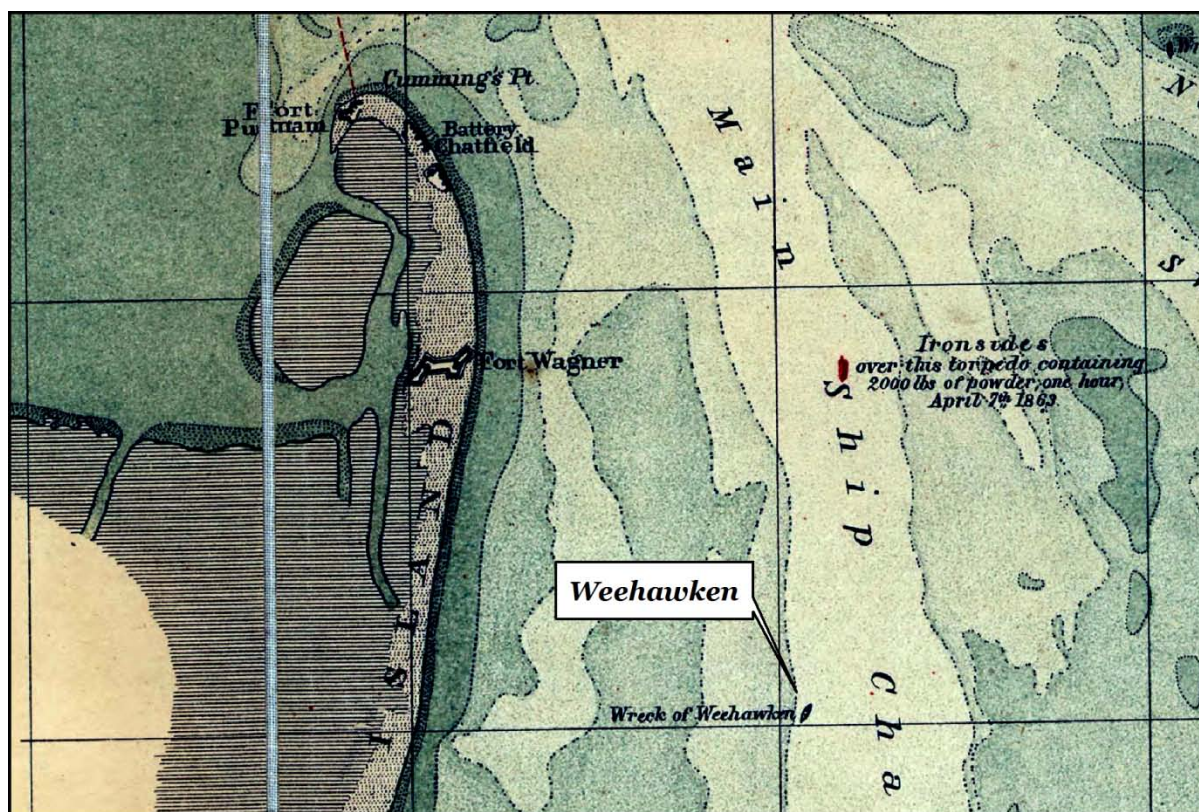


Figure 57: Top—Position of Weehawken on 1865 nautical chart (SCIAA graphic); Bottom—Magnetic contours of Weehawken (NOAA chart 11521, scale 1:80,000, 1999; SCIAA graphic)

lower hull may be intact and that the hull lies in a WNW-ESE orientation. However, the distance between magnetic peaks located at opposite ends of the site tend to confirm that at least 40 feet of the original 200-foot hull is missing (Spirek and Amer 2004:149-156).

As part of the ABPP fieldwork, MRD investigated the wreck site using a sub-bottom profiler on 12 October 2010. Lanes spaced approximately 5 m (16 ft) apart and a boat speed between 4-5 knots, were run approximately N-S and then E-W to obtain comprehensive magnetic data of the site. Using both a 10 KHz and 3.5 KHz frequency, no discernible reflector suggesting the presence of the wreck was detected. An indication, perhaps, of different sediment overburden than those covering the nearby *Keokuk* off the south end of Morris Island. Entombed in the sediments, *Weehawken* remains at station within the inner blockade bearing silent testimony to the Union navy efforts to close the harbor to the blockade runners.

Bowman's Jetty/Fort Moultrie Shipwreck Complex

Maffitt's, or Beach, Channel, was reportedly discovered several years before the war, running alongside Sullivan's Island and then turning inwards to the harbor throat near Fort Moultrie. The channel was the primary avenue of access and departure for the blockade runners after the appearance of the Federal fleet off the harbor. This was especially true as the evacuation of Morris Island by Confederate forces permitted the ironclads to maintain an inner picket that effectively closed the Main Ship Channel. The main attraction of the channel was that it offered the shortest route into and out of Charleston Harbor. Additionally, a series of Confederate batteries on Sullivan's Island lining the channel to Breach Inlet provided a buffer zone for the blockade runner to slip in between the island and the blockaders. Despite the navigational and security incentives for using this route, navigating the channel was fraught with danger. Simply entering the outer blockade zone proved troublesome as evidenced by the numerous blockade runners running ashore or chased and sunk, as too did departing the harbor, particularly around Fort Moultrie at the southwest tip of Sullivan's Island.

Navigation in the vicinity of Fort Moultrie and Bowman's Jetty was particularly tricky. Bowman's Jetty, named after Captain Alexander Bowman, US Army Corps of Engineers, was constructed to prevent severe erosion at the front of Fort Moultrie. Built between 1834 and the 1840s, Bowman constructed a series of breakwaters and jetties in front of the fort. The erection of the erosion barriers quickly accumulated approximately 100 yards of beach in front of the fort's walls (City of Charleston 1883:493-497). The negative impact of the jetty to navigation was not felt until the discovery of Maffitt's Channel and its increased reliance as a means to enter and exit the harbor during the war. An initial hint of the dangers of the jetty occurred during the Fort Sumter crisis in 1861, when the New York steamer *Columbia* grounded at Bowman's Jetty during a high tide on 25 January. A Union engineer in Fort Sumter believed that Bowman's Jetty had diminished the depth of water at its extremity. This decrease in depth forced a vessel headed to Maffitt's Channel, whether in or out of the harbor, to steer around the jetty some distance and then make a sharp turn to get back into the channel. This maneuver was also affected by the tides, with an ebb tide forcing a vessel onto the beach. During a haze and not taking into account the turn of the tide was

most likely the reason *Columbia* was forced onto the beach. The vessel did manage to get off on 29 January due to a very high tide (*ORA*, ser. 1, vol. 1:153-158). The same fate would happen to seven blockade runners, albeit contending not only with the force of nature, but also with the force of arms (Figure 58).

The histories of the blockade runners sunk at Bowman's Jetty and Fort Moultrie will be considered individually, but the post wrecking history of these wrecks is collective. During the 1870s harbor clearing project, the contracts to salvage the wrecks in this vicinity were let as a group. After discussing the histories of the blockade runners, the post wrecking history will follow, and conclude with the results of the MRD field investigations at this location.

Minho

The 253-ton wooden, iron-framed screw steamboat *Minho* was built in Scotland in 1854. The vessel measured 175.3 feet in length, 22 feet in width, and had a draft of 13.5 feet and three masts (Wise 1988:313; *ORN*, ser. 1, vol. 1:413). In April 1862, the US consul in Liverpool reported *Minho* cleared for Havana loaded with clothing, hardware, and heavy cases of unknown content, and described the steamer as built of iron, bark rigged, with one funnel (*ORN*, ser. 1, vol. 7:304). In late July 1862, *Minho* departed Nassau with a load of arms, powder, and other cargo, safely arriving and offloading its cargo in Charleston, departing the harbor in late August (*ORN*, ser. 1, vol.13:304).

At 3 AM on 20 October 1862, heavy cannon fire commenced from the Union blockaders as *Minho* attempted to slip once again into the harbor. Bound from Bermuda, *Minho* successfully evaded the blockaders during a dark and hazy night by passing northward of Rattlesnake Shoal, however the blockade schooner USS *George W. Blunt*, stationed at the extremity of Dewees Inlet shoal, fired at the passing vessel. Shortly afterwards USS *Flambeau* joined in the pursuit and threw nine shell at the passing vessel, but without stopping its progress, and continued the chase until receiving fire from the Confederate land batteries at Breach Inlet. In the morning the Union navy found the vessel aground at Fort Moultrie (*ORN*, ser. 1, vol. 13:395-397).

Grounded on the breakwater at Fort Moultrie, the rocks punched several holes in *Minho*'s hull letting in water. At low water, the leaks stopped and during the rising tide several Confederate harbor steamers attempted to tug the stricken vessel from the rocks to no avail. Noted as having several water-tight compartments, it was hoped the steamer and cargo could be saved. A sloop with part of the cargo had reached the city by afternoon (*The Charleston Mercury* 21 October 1862). The next day the vessel was still on the rocks and hope soon faded that the vessel could be saved along with the cargo as the hull was full of water and goods and broken packages were wet. *Minho* had previously run the blockade two times into the harbor with valuable goods and departed with cotton (*The Charleston Mercury* 22 October 1863).

On the morning of 5 November 1863, an auction was held to sell the goods recovered from the wrecked *Minho* consisting of a variety of goods including coffee, sugar,

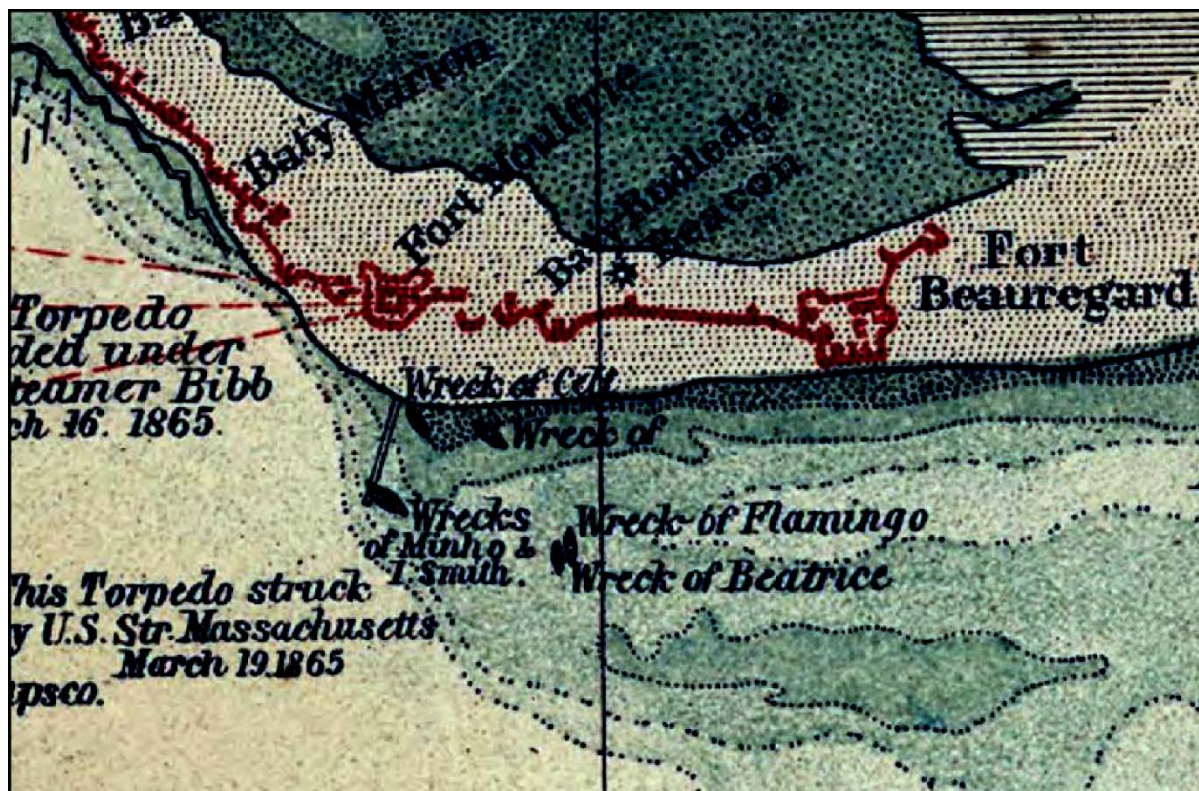


Figure 58: Top—1865 nautical chart showing sunken blockade runners at Fort Moultrie-Bowman's Jetty (US Coast Survey 1865); Bottom—Nun buoy marking underwater extent of Bowman's Jetty and base of jetty on beach, and Fort Moultrie in background at US flag (SCIAA graphic, photo).

clay and wooden pipes, gin, brandy, various hardware, and medicines and drugs (*The Charleston Mercury* 5 November 1862). That same day the hull of the vessel lying on the Sullivan's Island breakwater was sold for \$6,000.00 (*Charleston Daily Courier* 5 November 1863). A story in the *New York Herald* recounted that a US government chartered collier found *Minho* off the coast short of coal, having burned spare spars and wood work, and replenished the blockade runner with enough coal to reach the Nassau. Apparently *Minho* had just run the blockade offloaded its cargo and was returning to Nassau for another load. The paper stated *Minho* made a few more runs after this encounter in the summer of 1863 before ending its career on the Sullivan's Island beach (*The New York Herald* 3 November 1863).

Stono (formerly USS Isaac Smith)

The 453-ton single-screw wooden steamboat *Isaac Smith* was 171.6 feet in length, 31.4 feet in beam, and had a draft of 9 feet. The vessel was equipped with an unusual athwartship walking beam. Built in 1851 as a Hudson River passenger steamer, the vessel was purchased by the US Navy in September and commissioned as USS *Isaac Smith* on 17 October 1861 (*DANFS*; Parker 1883:306; *New York Times* 18 October 1861). During its refit in the Brooklyn Navy Yard, the steamboat had its upper deck removed and forward and aft ends enclosed in timbers to form a protective bulwark (*New York Times* 22 June 1902). The armament consisted of one 30-pounder Parrott rifle and eight 8-inch Dahlgren smoothbores. The gunboat was ordered to join the South Atlantic Blockading Squadron and participated in the Port Royal Expedition in November 1861. Following the capture of Port Royal Sound, the gunboat supported the blockade and participated in various Navy and combined actions along the Florida, Georgia, and South Carolina coast. On 7 August 1862, the gunboat was ordered north for repairs and arrived in New York on the 12th. By 12 October the gunboat was back in Port Royal and then stationed off Charleston, primarily at Stono and North Edisto Inlets (*ORN*, ser. 1, vol. 13:242, 250, 387, 419; *New York Times* 13 August 1862).

On 30 January 1863, *Isaac Smith* was sent to make a reconnaissance up the Stono River, which it had frequently done for several weeks. Without observing any Confederate forces, the gunboat anchored in the river between John's and James Islands. A masked battery with heavy guns on each island commenced firing at the vessel at a distance of about 75-100 yards. The gunboat attempted to proceed downriver but was disabled with a shot to its steam drum. Arthur Ford, an artilleryman at one of the Confederate batteries reported "... her stern was directly about 100 yards in front of the gun I served. It put one 8-inch shrapnel shell into her stern port, and I learned afterwards that the shell knocked a gun off its trunnions and killed or wounded eight men" (Ford 1905:15). The crew of the gunboat defended themselves for approximately 15 minutes under a tremendous crossfire from the barrage. Richard Stout, landsman, was awarded the Congressional Medal of Honor for carrying out his duties despite losing his arm in the ambush (USN 1950:50). Following the disabling shot to the steam drum, the gunboat dropped anchor and surrendered unconditionally to the Confederate forces. The gunboat lost 25 men killed and wounded, with 11 officers and 108 men captured. While the prisoners were landing, USS *Commodore McDonough* steamed upriver to assist and found the Union gunboat aground with steam clouds issuing from the steamer, a white flag flying, and two boat loads of officers and crew

going ashore. The Union gunboat fired at the batteries which returned fire until darkness compelled the *McDonough* to retire downstream. *Commodore McDonough* returned the next day and found the grounded gunboat in the same place, with some men aboard, and fired some shells at the vessel. Three days later, with much effort, including lightening the vessel by taking off the guns due to the shallowness of Wappoo Cut, the Confederates managed to tow the gunboat to Commercial Wharf in Charleston (*ORN*, ser. 1, vol. 13:556-560, vol. 14:219; *ORA*, ser. 1, vol. 14 (part 1):201-202; *The New York Times* 10 February 1863; *Charleston Mercury* 31 January 1863; *Charleston Daily Courier* 2 February 1863).

The captured Union gunboat was then turned over to the Confederate navy, renamed *Stono*, and used for various naval purposes in the harbor, especially relating to the torpedo service in April (Parker 1883:313-315). Shortly afterwards, plans were made to outfit the vessel as a blockade runner and send a cargo of cotton on navy account (*ORN*, ser. 1, vol. 14:694, 716, 494). On the night of 5 June, *Stono* steamed outward bound with 600 bales of cotton. The vessel was spotted by the Union blockader USS *Wissahickon* at 9:20 PM, which slipped anchor and began firing at the blockade runner and gave chase. The blockade runner changed course back into the harbor giving the Union sailors the impression that the vessel had been badly damaged. Returning to the harbor, the ship accidentally struck the Sullivan's Island breakwater and ran onto the rocks. The bulk of the cargo was offloaded and everything of value stripped from the wreck. Two Confederate deserters later reported the unknown steamer as the former *Isaac Smith* which had sunk (*ORN*, ser. 1, vol. 14:240-241; *ORN*, ser. 1, vol. 13:252; *The Charleston Mercury* 8 June 1863).

Presto

The iron side-wheel 552-ton *Presto*, originally *Fergus*, was built in Glasgow, Scotland, in 1863. The vessel measured 210 feet in length, 23 feet in beam, and had a draft of 9.5 feet (Wise 1988:317). When named *Fergus*, the US Consul in London noted the vessel was built unusually strong for a merchant vessel and perhaps intended as a privateer (NARA RG 45, Navy Subject File 1775-1910, Box 361). At daylight on 2 February 1864, Union blockaders discovered that the blockade runner *Presto* had run ashore just to the east of Fort Moultrie while attempting to enter the harbor. Admiral Dahlgren noticed the stranded vessel and ordered the advance monitor to open fire at a range of 2,500 yards on the steamer. The other monitors advanced and began a general fire on the steamer. Union land batteries also opened fire and by morning large holes in the hull and wheel boxes appeared. Confederate batteries answered in return. By 1 PM the mainmast was cut away and the vessel was in flames. Several shells passed through below the waterline and most likely damaged machinery and cargo. The wreck was bombarded for a couple of more days causing the vessel to burn to the waterline. *Passaic* had picket duty the night of the 3rd and stationed a picket boat near the stricken vessel to detect any enemy movement on the vessel. From 2-4 February, the Union land batteries fired 769 projectiles from 30-pounders to 300-pounder Parrotts at the wreck. During this time Confederate batteries on Sullivan's and James Islands returned a steady barrage at the Union batteries. By the end of the Union cannonade the hull was shattered and had the appearance of breaking apart. A *Boston Herald* article reported a shell from a 200-pounder Parrott from Fort Wagner nearly cut the vessel in two. Union forces later gathered intelligence that the steamer was *Presto* from Nassau

loaded with blankets, shoes, and salt beef. Apparently the steamer struck an old wreck between Fort Beauregard and Fort Moultrie (*ORN*, ser. 1, vol. 15:262-266; *ORA*, ser. 1, vol. 35 (part 1):103-104, 467-468; *The New York Herald* 14 February 1864).

On 4 February, a monitor with three field pieces on deck approached closer to the wrecked blockade runner. The exposed nature of the Union gunners roused the batteries on Sullivan's Island to reply with vigor (*Charleston Mercury* 3-5 February 1863; *New York Herald* 13 February 1864). Despite the intense Union barrage on the blockade runner, the Confederates attempted to salvage the valuable cargo. The Confederate government had majority ownership of the vessel with the remainder in private hands. Although declared a total wreck, much of the cargo was saved. On the night of the 4th, they had constructed a foot bridge from the shore to the wreck (*ORA*, ser. 1, vol. 35 (part 1):103-104). A correspondent from the *Savannah News* recounted the discovery of the stranded blockade runner by Confederate troops. Finding the vessel abandoned by crew and passengers, the soldiers waded out to the ship and began to avail themselves of sardines, jellies, fruits, and liquor among other items. Shortly afterwards, Union blockaders began shelling the steamer and the soldiers quickly departed from the wreck (*Charleston Mercury* 8 February 1864).

Prince Albert

The iron-hulled steamboat propeller *Prince Albert* was built in Dumbarton, Scotland, in 1849. The steamer measured 138.1 feet in length, 16.7 feet in width, and had a 7 foot draft (Wise 1988:317). The US consul in London visited the steamer in October 1863 and noted it had large Hodge boilers standing about 3 feet above the deck, an 80-horsepower engine, and was intended for trade with Southern ports from Nassau or Bermuda (NARA RG 45, Navy Subject File 1775-1919, Box 361). During the night of 8 August 1864, *Prince Albert* from Nassau got ashore near Sullivan's Island breakwater. Apparently the steamer had passed undetected through the picket tugs and boats, and especially galling to Admiral Dahlgren, was that the blockade runner went unnoticed by the advance picket tug *Dandelion*, whose captain had anchored his vessel contrary to orders and remained at the anchorage rather than remaining mobile. Monitor *Catskill* discovered the steamer off Fort Moultrie on the morning of 9 August 1864. The monitor and land batteries at Cumming's Point opened fire on the stranded steamer. After a few effective shots they succeeded in destroying the steamboat, including bursting the boilers, and setting it on fire. Only a small quantity of cargo was believed to be offloaded, primarily medicines and other small articles, although the *New York Herald* reported a large part of the cargo of the heavily laden vessel was salvaged by the Confederates. An Army report stated that between the evening and morning of 8-9 August a severe artillery duel between Fort Strong on Morris Island and Sullivan's Island had taken place and speculated the blockade runner had perhaps either been struck by a shell or run aground to avoid the shelling (*ORN*, ser. 1, vol. 15:624; *ORA*, ser. 1, vol. 35 (part 1):22; *ORA*, ser. 1, vol. 35 (part 2):72; *Charleston Mercury* 10 August 1864; *New York Herald* 19 August 1864).

Flora

Flora was an iron-hulled, side-wheel steamboat that grounded off Fort Moultrie on 22 October 1864 (Wise 1988:300). The last voyage of *Flora* was a difficult one. Upon departing Nassau the steamer was compelled to land at Elbow Key in the Bahamas, and then while leaving there fell in with a Union blockader. During the subsequent chase the steamer threw overboard all its cargo and managed to escape during the night. Arriving off Charleston Harbor at Dewees Inlet, the steamer fell in again with blockaders and despite being cut-off managed to reach Maffitt's/Beach Channel whereupon it fell in with the Union picket boats. Passing the inner picket boats the vessel grounded in shallow water on the south side of beach channel. Stuck fast and impossible to refloat, the steamer was spotted in the daylight and the Union batteries on Morris Island began shelling the vessel. The crew escaped safely by boats to Sullivan's Island (*Charleston Mercury* 24 October 1864). For a couple of days the monitors and Morris Island batteries continued their destruction of the wreck of *Flora*, and the Sullivan's Island batteries returned fire primarily directed at the monitors (*Charleston Mercury* 25-27 October 1864).

Army reports stated the Morris Island batteries discovered the large side-wheel iron steamer with two smokestacks opposite Battery Rutledge on Sullivan's Island in the morning. The advance picket monitor, *Patapsco*, fired first, and then Fort Putnam opened up with two 30-pounder Parrotts which struck the hull of the blockade runner. Battery Chatfield shot at the stranded steamer with a 300-pounder Parrott tearing off the wheelhouse and breaking away a large section of the amidships upper works. Fort Strong joined in with three 100-pounder Parrots striking the hull and decks many times. Two monitors also kept up a fire on the wreck. Shallow water and rough seas at the wreck site thwarted Union efforts to set the steamboat afire. The batteries at Morris Island expended approximately 144 shells of which a total of 98 struck the vessel rendering it a total wreck (*ORN*, ser. 1, vol. 16:29-30, 32; *ORA*, ser. 1, vol. 35 (part 1):108).

The Union forces later learned from an intercepted telegram that the name of the blockade runner run aground by the picket launches off Fort Moultrie was the *Flora*, loaded with an assortment of cargo (*ORN*, ser. 1, vol. 16:29-30). The manifest of the blockade runner revealed the cargo included nine boxes of flannel, eighty cases of shoes, 250 pounds of lead, and forty barrels of saltpeter (NARA RG 109, M909). A report from Major General Foster mentioning the destruction of the steamer said the navy calls the vessel *Flamingo*, while the Southern papers call it *Flora*, or *Florinne* (*ORA*, ser. 1, vol. 35 (part 1):27). The incorrect name persisted as Northern newspapers reported that a large blockade runner, *Flamingo*, was driven ashore on 23 October 1864 by Union batteries (*The New York Herald* 2 November 1864). The *Flamingo* name persisted, as the 1865 nautical chart shows one of the wrecked blockade runners off Fort Moultrie with that name rather than *Flora*. The actual blockade runner *Flamingo* survived the war (Wise 1988:299).

Beatrice

The 274-ton iron screw steamer *Beatrice* was built in Scotland in 1863. The steamer measured 167.5 feet in length, 24.1 feet in width, and had 12 foot draft (Wise 1988:290). On

the morning of 28 November 1864, heavy cannon fire resounded throughout the harbor as Union batteries pounded a beached blockade runner. Bound from Nassau, the steamer *Beatrice* had grounded on the beach of Sullivan's Island during a fog earlier that morning. The steamer on attempting to enter the harbor was surrounded by Union picket barges which kept up a constant fire of grape and musketry on the vessel. The captain and eight of the crew escaped from the wrecked steamer to Battery Rutledge just as Union sailors boarded the vessel. Thirty of the crew were unaccounted for and thought captured. By the early afternoon the steamer was completely riddled with shot and burned. Later the mailbag floated ashore and was sent to the city (*Charleston Mercury* 29 November 1864).

From the Union perspective between 11 and 12 PM in the evening of 27 November 1864, the blockade runner *Beatrice* from Nassau was spotted and given chase. Outside blockaders sighted, signaled, and fired upon the steamboat striking it twice as the vessel steered towards the harbor. Two picket boats repeatedly discharged their howitzers and then tried to board the steamer but were prevented because they grounded several times in the shallow water. Crews from the scout boats boarded the vessel and were later assisted by two picket launches. Immediately after boarding, the blockade runner grounded on Drunken Dick Shoal. The vessel's captain and eight others escaped to shore in a boat, while thirty others were captured. The Union sailors salvaged several nautical instruments and two boats. The stranded vessel was set afire and abandoned and was declared a total wreck (*ORN*, ser. 1, vol. 16:112-114).

Celt

The wooden side-wheel steamboat *Celt* was built in Charleston in 1862 at South Bay Street. The vessel was of light draft and built with white oak and pine and intended for use for either heavy freight transportation or as a gunboat. The vessel measured 160 feet in length, 25 feet in breadth, and a depth of hold of 9 feet. *Celt* was built to replace *Planter* which had been abducted by its slave crew who had escaped to the blockaders (*Charleston Courier* 16 May 1862). The vessel was operated by the Quartermaster Bureau for use in the harbor. On 14 February 1865 the steamboat grounded off Fort Moultrie when attempting to leave the harbor (Wise 1988:292). Around 2 AM on 15 February 1865, an advance Union picket launch hailed a boat with seven men in it off Sullivan's Island. They identified themselves as crew of the blockade runner *Celt*, which had run ashore the previous night while attempting to exit the harbor. These men were found to be deserters and the rest of the crew had gone ashore (*ORN*, ser. 1, vol. 16:246). *Celt* had run ashore near the breakwater at Fort Moultrie several days before the evacuation of the harbor by Confederate forces. Inspection by the Union navy after the Confederate evacuation found a valuable load of cotton aboard, of which 190 bales were subsequently recovered and sent north, with the remainder to follow. A survey of the remains of the blockade runner found the back or keel of the hull broken and full of water, decks ripped apart, and the boilers below water along with the machinery, and deemed it worthless to recover (*ORN*, ser. 1, vol. 16:256).

Post Wrecking History

After the evacuation of Charleston, an Union navy commander reported salvaging everything of value off *Beatrice* and an un-named wreck lying nearby, most likely *Flora*. He also examined the wrecks of *Minho* and *Prince Albert* and found them badly sanded and nothing was recovered. Additional efforts to salvage the blockade runners were determined a waste of time and effort by the navy. The navy subsequently entered into a year-long contract with Mr. Gray to salvage these and other Confederate properties in and around the harbor (*ORN*, ser. 1, vol. 16:354-355).

In 1871, a proposal was made to remove *Stono* and other blockade-runners wrecked on Bowman's Jetty (USACE 1871:582). A contract was entered into with Mr. Joel Griffin, 30 September 1872, for removal of 125 linear feet of Bowman's Jetty and the wrecks to a low-water depth of 20 feet. The stone removed from the jetty was piled up on the inshore end of the jetty, and some was deposited in deepwater west of the channel end of the jetty (USACE 1871:727; US Secretary of War 1874:4). A diver was sent down to investigate the wrecks and found that *Minho*, *Stono*, and *Prince Albert*, and another unnamed wreck were deeply embedded in sand with portions of the wrecks exposed due to the scour of the tide (USACE 1873a:730-1). In 1873, salvagers, primarily Benjamin Maillefert, removed from the east side of the jetty, and lying close to it, the wrecks of *Stono*, *Prince of Wales*, and another wreck, mistakenly called *Juno*, which had sunk in the Atlantic Ocean (USACE 1874a:5). In 1878, the outer end of Bowman's Jetty was lowered two feet for a distance of 30 feet (City of Charleston 1883:493-497). When working to remove wrecks and stones from the jetties, they found the work difficult with heavy seas, strong currents, and winds (US Secretary of War 1874:4).

In the mid 1980s to early 1990s, Howard Tower, a Florida salvager, and associates obtained several salvage licenses issued by SCIAA to work on the wrecks of the blockade runners off Fort Moultrie and Bowman's Jetty. The group proposed defining the remains of the shipwrecks, recovering artifacts, and conducting historical research. The license stipulated a 50/50 division of the artifacts between the state and salvagers. The salvagers referred to the site as "...a nautical junk pile of Civil War vessels..." They found *Stono* and *Minho* lying roughly parallel to each other, with wreckage of the supposed *Prince Albert* scattered amongst the *Minho*. These two wrecks consisted of several sections of iron hull and associated beams rising from one to three feet off the bottom. They did not find much evidence of *Prince Albert*, but did locate several lead pigs marked "Greenside Mill" and numbered and dated 1863. Subsequent research by the salvagers determined these lead pigs were purchased in 1864 and most likely were part of *Prince Albert*'s cargo. Tower believed that most of this blockade runner's hull was salvaged. The wrecks lay on a slope ranging in depth from 6.0-9.1 m (20-30 ft) of water. In 1989, Hurricane Hugo struck Charleston Harbor and on-site inspections afterwards found a substantial amount of sand overburden covering previously exposed sections of the wreck. Subsequent post-Hugo excavations by the salvagers found historic artifacts intermixed with more modern debris. A visual search undertaken by the salvager for *Flora* and *Celt* from Bowman's Jetty to Fort Moultrie yielded no results (Salvage License no. 32 file, on file at MRD/SCIAA).

The focus of the salvagers was primarily devoted to the *Minho* and *Stono* wreck sites. Investigations at the *Minho* site revealed broken pieces of iron hull of varying sizes and mixed in with *Stono* and jetty rocks. The longitudinal axis of the wreck lay on a northwest to southeast line. In 1987, they located a 9.1 m (30 ft) section of *Minho*'s stern, with portions of the hull rising nine feet off the bottom. At this location of the wreck, the salvagers recovered several small arms and accessories, two cases of Enfield rifles, bullets, and 11,000 percussion caps from a crumpled case, and other items. Examination of one of the cases of Enfield rifles determined they were constructed of wooden tongue-and-groove boards to form the outer container, with a lead sheathing encasing twenty rifles which apparently were packed in grease. The brass components, butt plates and trigger guards, were in good conditions, but the wood and iron components were deteriorated, except those elements still in the hardened grease. Most of the wreck was covered in sand (Salvage license on file MRD/SCIAA).

Remains of *Stono*'s hull, the only wooden wreck among the other iron-hulled blockade runners, ran east to west over a distance of approximately 120 feet. The east end was buried under a sand mound. Extant hull structure survived up to the turn of the bilge in places with a maximum breadth of 25 feet. A 40 foot section of the hull extended west from the sand mound with portions of the hull rising a foot or two off the bottom. At the west end a conglomerate of a boiler and other pieces of smaller machinery marked the visible terminus of the wreck. Outer hull planking consisted of an inner course of strakes and an outer layer of sacrificial wood a couple inches thick sheathed in copper. Sandwiched between the wood was a layer of animal hair and tar. Copper spikes and drift pins littered the site. A huge, crumpled lead sheet weighing approximately 200-300 pounds was found that may have been the interior lining of the powder room. A number of artifacts were retrieved over the course of the salvage project including small machinery parts, fasteners, coal, and lead sounding weight, among other miscellaneous items. The group offered for sale a number of these and other artifacts including copper and lead sheathing, copper spikes, and sheathing nails. Two anchors lying approximately 70 feet from *Stono* were removed from the site. The anchors, believed to be associated with *Stono*, were recovered and turned over to Patriots Point Naval and Maritime Museum in Mt. Pleasant (Salvage License no. 32 file, on file at MRD/SCIAA).

Archeological Investigations

On 8 August 2001, MRD conducted remote sensing investigations of the remains of *Stono* (*Isaac Smith*) and *Minho* sites off Bowman's Jetty using funds from a Department of Defense Legacy Resource Management Program grant administered by the NHHC as part of the Naval Wreck Survey (Figure 59). Both the magnetometer and side-scan sonar were deployed. The search area measured 395 m (431yd) in length and 115 m (125yd) in width, with the northwestern end of the lanes truncated due to the jetty. Lanes were spaced 15 m (16.4 yd) with a boat speed of 4-5 knots. The magnetic contours revealed an intense multi-component signature at the underwater terminus of the jetty with an amplitude of 1,373 gammas. The anomaly disturbed an 8,062 sq m (9, 642 sq yd) area, although part of the disturbance was influenced at the southern extremity by the presence of a nun buoy marking the terminus of the jetty. Several small anomalies under 15 gammas were present on the southeastern area of the survey block, indicative of small isolated ferro-magnetic objects.

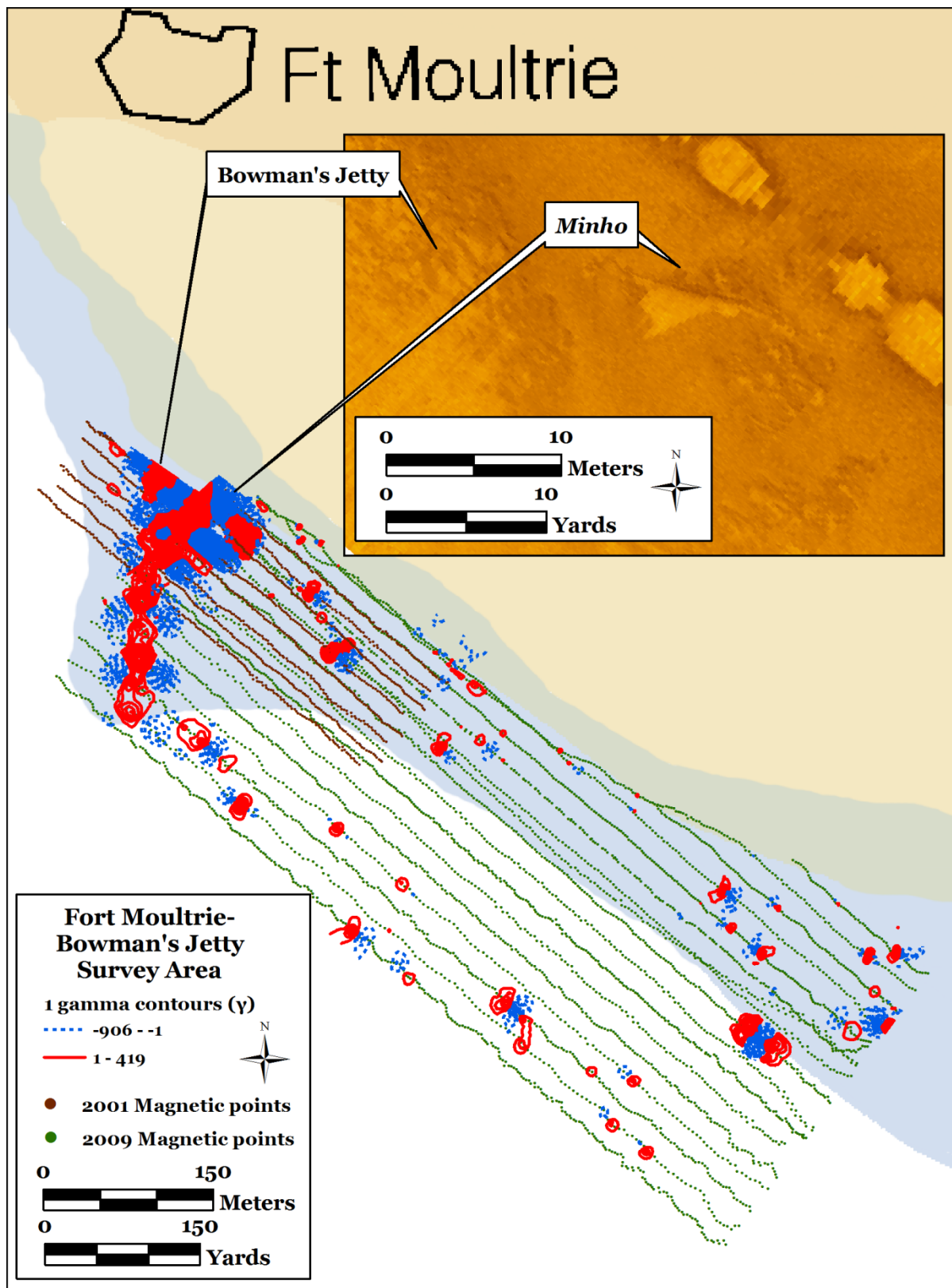


Figure 59: Magnetic contours of Bowman's Jetty and Fort Moultrie survey area. Inset image—Sonogram of section of Minho wreckage (NOAA 11524, scale 1:80,000, 2010; SCIAA graphic).

Sonograms revealed the terminus of the jetty and isolated rocks, as well as various elements of the shipwrecks to the southeast of the jetty.

The focus of the 2001 Naval Wreck Survey remote sensing operations at Bowman's Jetty was on obtaining electronic data of the intermixed *Stono* (*Isaac Smith*) and *Minho* site. For the ABPP fieldwork, MRD expanded the search area to include the entire collection of blockade runners reported wrecked in the vicinity of Bowman's Jetty and Fort Moultrie. When preparing for the ABPP fieldwork to survey the shipwrecks, the 1865 georeferenced chart was overlaid the modern nautical charts. When marking the positions of each wreck it became apparent that at least four of the wrecks were most likely now lying under Sullivan's Island: *Celt*, *Presto*, *Flora*, and *Beatrice*. These blockade runners lay under the beach rather than underwater due to the accretion of the south tip of Sullivan's Island as a result of the Charleston Harbor Jetties (Figure 60). To verify this finding, MRD undertook both a submerged and terrestrial survey to locate the remains of the blockade runners in this area of the battlefield.

On 12 March 2009, MRD commenced the underwater portion of the survey to locate the blockade runners. The intent of the survey was twofold: to determine if the suspected buried blockade runners were underwater, or if magnetic signatures suggestive of shipwrecks were absent, thereby increasing the probability that the wrecks were presently buried under the beach; and to gather additional data of the *Minho*, *Stono* (*Isaac Smith*) and *Prince Albert* sites. The survey area measured 800 m (874 yd) in length and 290 m (317 yd) in width. The last several survey lanes hugged the shoreline of Sullivan's Island. Survey lanes were spaced 20 m (21.9 yd) apart with a boat speed of 4-5 knots. Both the magnetometer and side-scan sonar were deployed. Water depth measured between 0.9-7.6 m (3-25 ft).

Due to an outgoing tide, the survey boat did not cover the 2001 survey area of the *Stono* and other wreck sites. Only a magnetic hint of the *Stono*, *Minho*, and *Prince Albert* wrecks was detected in the northwestern portion of the survey block. Additionally, a magnetic anomaly only vaguely detected in 2001 shows up as a series of linear magnetic anomalies radiating to the south from the jetty. The small amplitude and linearity of the magnetic anomaly suggest the presence of a cable or perhaps an old chain used to anchor the nun buoy off the jetty. The remainder of magnetic anomalies ranged in amplitude from 55 gammas to several gammas in size in the survey area. The isolated nature and size of the anomalies suggest they are small to medium-sized ferro-magnetic objects, most likely modern in nature, but also perhaps associated with the Union shelling of the stranded blockade runners, Fort Moultrie, and other batteries on Sullivan's Island. They do not appear to indicate the presence of the remaining blockade runners sunk in this area.

Sonograms obtained during the 2009 survey work at the *Stono* and *Minho* wreck sites revealed the rocks associated with the jetty terminus. In one instance, the sonar depicted an 8 m (26.2 ft) section of hull protruding 3 m (9.8 ft) above the bottom. This may reflect the section of *Minho*'s hull as reported by Tower where he recovered a number of artifacts, including the two cases of Enfield rifles. No other discernible acoustic imagery of the other wrecks at Bowman's Jetty was gathered or for the other anomalies in the survey area, and therefore they are presumed buried.

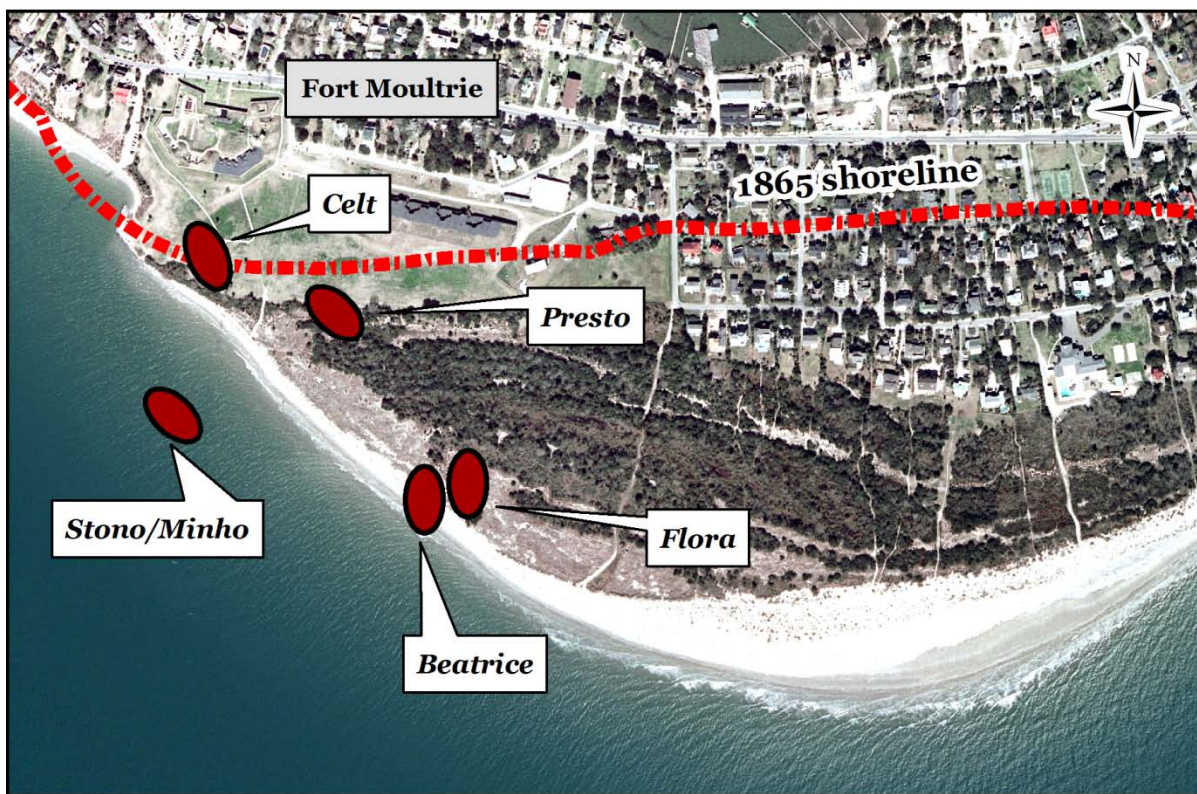


Figure 60: Top—1865 nautical chart overlay Fort Moultrie-Bowman's Jetty area (US Coast Survey 1865; NOAA aerial image); Bottom—Presumed wreck locations marked on aerial image and 1865 shoreline (NOAA aerial image; SCIAA graphic).

On 11 April 2009, Dr. Jonathan Leader, the state archeologist, deployed the hand-held gradiometer and ground-penetrating radar in an attempt to locate the blockade runners: *Celt*, *Presto*, *Beatrice*, and *Flora*, presumably buried under the beach. At the georeferenced location of *Celt*, and its position further secured by the presence of the jetty, both the gradiometer and GPR did not detect the presence of ferro-magnetic materials or a reflector indicating the presence of a shipwreck. Access to the *Beatrice* and *Flora* was problematical due to the presence of dense foliage and a solid stand of trees. Getting as close as possible to the presumed location of *Beatrice*, a spike of 400 gammas by the gradiometer was obtained, indicating the presence of large ferro-magnetic objects. Advancing as close as possible to the *Flora* wreck site induced a curious drop in the gradiometer readings, perhaps a positive sign the wreck is nearby. The magnetic signatures of the two sites in close proximity to each other would be quite complex and comparable to the *Stono/Minho/Prince Albert* and *Georgiana/Mary Bowers* shipwreck assemblages. The georeferenced area of *Presto*, situated the remains in an impenetrable area of trees, preventing Dr. Leader from deploying the equipment and searching for this wreck. The results of this reconnaissance survey suggest the presence of two of the blockade runners, and additional work is necessary to determine the presence or absence of the two other shipwrecks.

Conclusion and Recommendations

Numerous archeological sites were investigated during the ABPP fieldwork to meet the main objectives of locating and gathering baseline electronic and physical data of these battlefield resources. In addition to completing the objectives on a number of sites, an equal number are only now in the initial stages of documentation, for example First Stone Fleet, 7 April 1863 battleground, and several blockade runners. Future investigations are necessary to verify and confirm the location of these resources, as well as to continue searching for elusive remnants of the battlefield, such as the Second Stone Fleet. The next section synthesizes the historical, archeological, and environmental data to place each of the documented resources within the overall Charleston Harbor Naval Battlefield.

Chapter 4 KOCOA Battlefield Analysis

Introduction

Battlefields are generally thought of as engagements lasting for several hours or days at most—and fought on land. The siege of Charleston Harbor, however, spanned four years from the Federal surrender of Fort Sumter in 1861 to the Confederate abandonment of Fort Sumter in 1865—and was fought on land and sea. Combined Union army and naval forces attempted to wrest control from the steadfast Confederate defenders to no avail. Only the anticipated arrival of Sherman from the rear sprung the harbor open to Union forces. During those four years a number of naval and combined actions occurred as each antagonist strove to meet their respective military objectives. Major battle events included the Confederate ironclad sortie against the blockading fleet on 31 January 1863, the 7 April 1863 Union ironclad attack on Fort Sumter, the Union capture of Morris Island and reduction of Fort Sumter through combined operations, and attacks by Confederate semi-submersibles and a submarine on the blockading fleet. If one were to compress these actions spanning four years into a day and on a map, it would clearly resemble a traditional battlefield with advances, counter-thrusts, skirmishes, etc., all constrained by the natural, cultural, and military engineering features present in this maritime landscape. While these actions occur in temporally isolated incidents, they are still spatially constrained by these same features. The following section introduces a set of military engineering considerations known by the acronym KOCOA and uses this framework to discuss the naval and combined actions and the relationship of the archeological resources within the battlefield. The chapter concludes with a description of the modern battlefield landscape.

Preparing for battle requires a thorough understanding of the landscape on which it is to be fought, in the case of the Charleston Harbor Naval Battlefield the field of battle was in a coastal environment. Here the Confederate and Union military forces contended with both land and water to devise their battle strategies. The army and navy forces were forced to read the “writing on the ground” and the “writing on the bottom” to apply the proper use of the coastal terrain to meet their objectives—the one to defend and the other to dislodge. The Confederate defenders retained crucial land and water terrain at the throat of the channel necessary to observe, communicate, and maneuver in response to Union attempts to assail the harbor while aiming for the city. The Union naval forces also in a sense were defenders as blockaders, attempting to achieve the same objectives of selecting key submerged terrain to prevent the egress and ingress of blockade runners from Charleston Harbor. When making offensive moves, the Union navy again used the natural land and underwater terrain to launch its attacks, and here they met the Confederate coastal defenses positioned to prevent the success of these naval movements.

The art of military engineering, or shaping the physical environment for defensive and offensive purposes, has been employed through the millennia by combat forces. During the American Civil War, many of the key commanders had graduated from the United States

Military Academy at West Point, with a solid foundation in military and civil engineering principles (<http://www.usma.edu/history.asp> [6 April 2011]). From the naval perspective, the career and volunteer officers of the Union and Confederate navies applied the practical knowledge of seafaring and warfare gained from the United States Naval Academy and years at sea for both naval and commercial purposes to position themselves accordingly on the naval battlefield. The Civil War transformed military engineering from relying on brick fortifications to constructing earthen fortifications of sand and dirt to better respond to the improvement in large ordnance, especially in relation to size of the projectiles thrown and accuracy of rifled guns. The mobility of naval vessels, relying on steam, and the addition of ironclads, presented another set of problems for naval and land commanders to solve to meet their defensive or offensive objectives. The following section relies heavily on the *Seabee Combat Handbook, Vol. 2* (SCH) published by the US Navy to formulate the proper use of terrain in locating one's defenses.

KOCSA Scheme

In preparing for battle, the proper use of the terrain is necessary to meet the desired objective to defend or attack a position. The modern military engineer relies on the acronym KOCSA, a set of military considerations to position defensive or offensive arrangements. Another important factor is the connection between the terrain and the weather, as variable climate conditions limit the effectiveness of the KOCSA components. In regards to naval forces, the "sea state" is also an important factor for deliberation. KOCSA stands for:

- K**ey terrain
- O**bservation and fields of fire
- C**oncealment and cover
- O**bstacles to movement
- A**venues of approach

Key terrain is using the terrain to tactical advantage by maximizing a force's ability to apply combat power, oftentimes by channeling an enemy into a designated zone of fire. Decisive terrain is ground that must be controlled to meet the objectives of defense or accomplish the mission. Observations and fields of fire are inextricably linked together as the enemy must be observed to apply firepower. Factors limiting observing enemy movements include weather conditions, time of day, vegetation and surrounding terrain. Oftentimes the highest terrain is ideal for observations, but in some cases, choosing areas the enemy must pass through are of equal or greater importance. The field of fire relates to the area a weapon or group of weapons may effectively cover from a given position, with the main objective to engage the enemy as far out as possible. Concealment and cover pertain to the protection from fire and from observation. Obstacles to movement include natural or artificial terrain features that stop, impede, or divert military movement. These could include towns, fences, rivers, and engineered obstructions such as entanglements, earthworks, and ditches. Avenues of approach are the routes the enemy is likely to travel to reach its objectives. The defending forces must evaluate these possible routes and the key terrain when planning their fields of fire, observation points, and concealment and cover. An important intangible element that works in the favor of the defender is time. Time allows for

the defender to study the terrain in detail and make the best use of it to prepare the defenses. Time permits careful preparations at the initial stages of the defense, and the successful application of the KOCOA scheme then permits continued improvements to the defenses. (SCH:4—2-5). These comprise the KOCOA characterizations when preparing for battle. Therefore, to reverse engineer a historical battlefield, a researcher may utilize the paradigm in conjunction with the historical accounts and the remaining archeological features to arrive at an interpretation of how the battle unfolded.

One of the initial applications of the KOCOA scheme to interpret an historical battlefield was undertaken by the National Park Service at the Gettysburg Military Park in 2000. In an effort to better understand the troop movements and actions, and to interpret these findings to the public, NPS personnel wanted to rehabilitate the natural, topographical, and cultural features of the battlefield to a close facsimile to those encountered by the combatants in 1863. Each of the features in the battlefield were examined and mapped in context to the KOCOA paradigm. Combined with historical research of troop movements, the application of the KOCOA scheme provided a framework to analyze the battlefield landscape, and to determine the important features crucial to the battle's outcome. The knowledge gained by applying the KOCOA framework to the Battle of Gettysburg served to improve the educational benefits for research and to the public (<http://www.nps.gov/gett/parknews/gett-battlefield-rehab.htm> [6 April 2010]; Lawhorn 2002:36).

Mainly applied to analyzing the terrain related to landforms, the applicability of this scheme to naval purposes is particularly useful in understanding a battle fought in coastal waters. The shoals and channels of coastal waters act as impediments to fleets, in a manner similar to hills and valleys that confine the movement of armies. Weather is also an important variable in coastal waters varying from periods of glass-like conditions to raging gales, and from limitless views to restricted visibility caused by storms, squalls, fogs, and moonless nights. Another important feature of coastal waters is the diurnal tides that combined with the shoals and channels necessitated an awareness and appreciation when planning naval strikes. The next section applies the KOCOA paradigm to analyze the natural, cultural, and military features at Charleston Harbor and then discusses the naval actions and the locations of the remains of the archeological features within context of the battlefield.

KOCOA Analysis of the Charleston Harbor Naval Battlefield

Much like a defender planning for battle, before applying the KOCOA analysis to the Charleston Harbor Naval Battlefield, an understanding of the natural, cultural, and military features before the war commenced is necessary to understand the subsequent preparations and battle events that occurred from 1861 to 1865. The natural features relating to the coastal environment comprised the ocean, ebb-delta complex, channels, barrier islands, marshes, rivers, inlets, tides, and rivers at the harbor. Cultural features at the harbor included navigation aids, Bowman's Jetty, Moultrieville on Sullivan's Island, Mount Pleasant, and the port city of Charleston. Military features existing before the war to defend Charleston Harbor consisted of Fort Sumter, Fort Moultrie, Castle Pinckney, and the abandoned Fort Johnson. As the defending force, the Confederates assessed the probable Federal avenues of

attack, and conformed and strengthened their defenses in relation to the natural, cultural, and military features of the harbor. The important element of time was also on their side and was wisely used from the surrender of Fort Sumter in April 1861 to the eve of the 7 April 1863 Federal ironclad attack. The successful repulse provided more time to strengthen and modify the defenses until the abandonment of the city in February 1865 by Confederate forces. The preparations of the invading Federal forces also had to conform to the coastal environment, and in the case of the navy, the ever changing sea state that affected all plans and actions.

Applying the KOCOA scheme to the naval battlefield relied on several sources of information. Historical sources included the official reports of the actions and recollections of the participants. Of primary importance was the general *Map of Charleston Harbor, SC Showing Rebel Defences [sic] and Obstructions* compiled after the Federal occupation of the harbor in 1865. The chart depicts from direct evidence and informant testimony the culmination of Confederate defenses to February 1865. The map graphically displays the engineering of the outer and inner harbor defenses to keep the Union navy and army at bay. Additionally, the map shows the various casualties of these defenses, i.e., *Patapsco* and *Keokuk*, and of the Federal blockade, i.e., the blockade runners wrecked at Fort Moultrie and along Maffitt's/Beach channel. Other maps and drawings, showing the 7 April 1863 ironclad positions and the disposition of the blockading fleet, aided in understanding the battlefield. The manifestations of the Confederate and Union naval events comprised in the archeological record bear testimony to the protracted struggle at Charleston Harbor. Each source helped to apply the KOCOA scheme to the battlefield and to understand the combatant's preparations for the conflict and then to interpret the battle sequences evident in the historical and archeological records.

The Confederate defensive goals were to defend Charleston from Union assaults and to maintain the harbor for the use of blockade runners to bring valuable military supplies and commercial goods and to depart laden with naval stores, rice and cotton. Referring to the 1865 chart, and working outwards from the city to the ocean, reveals the Confederate defense utilizing the natural, cultural, and military features of the harbor. Essentially, the defenses were conceived as a series of gauntlets for the Union fleet to struggle through. The city, inner harbor, and outer harbor defenses were designed to be mutually supportive to resist a naval attack. The city, situated on a peninsula formed by the Ashley River to the west and the Cooper River to the east, was defended with the placement of eight earthen batteries along the city shoreline. An entrenchment to the north of the city, at the neck, served to form a defensive perimeter. These comprised the city defenses. They were located on the waterfront to prevent a naval assault on the city and from land assault primarily anticipated from the west on the mainland or James Island. The Cooper River batteries would defend against an attack from the east at Mount Pleasant, where a number of floating barrel torpedoes at the entrance of the Wando River would thwart a water-borne attack from that quarter, which were supported by a battery at Hobcaw Point.

Batteries located to the west on the mainland and James Island provided a cross-fire with the city defenses on the Ashley River. These batteries also defended the entrance to Wappoo Cut that led to the Stono River to the west, which was known as the back-door route to Charleston. Additional batteries on James Island, including the resurrected Revolutionary

War-era Fort Johnson, and across the harbor to Mount Pleasant defended the inner harbor, provided a cross-fire with each other and with the city defenses located at the tip of the city at White Point Gardens. The pre-existing Castle Pinckney, located to the east of the city and on a small islet in the harbor protected the inner harbor and the several channels leading to and east of the city, namely Hog Island Channel, Folly Island Channel, and the Cooper River entrance. Fort Ripley, erected during the war on the Middle Ground Shoal to the south of Castle Pinckney guarded the inner harbor, the Folly Island Channel, and the city.

By 1865 a number of frame, floating, and boiler torpedoes were deployed in the inner harbor channels. Frame torpedoes were placed in the Ashley River entrance, Hog Island Channel, Folly Island Channel, and at a small channel between Hog Island and Folly Island Channels. The obstructions were augmented at the Hog Island Channel with a floating boom, and at the Folly Island Channel with a row of pile obstructions spanning the channel and the Middle Ground Channel. Fort Ripley was situated to the west of the Folly Island Channels to cover those obstructions. The entrance to the Cooper River was unobstructed due to depth, as well as the need for keeping safe passage for the blockade runners and other vessels navigating the harbor. Defense of the river entrance instead relied on the guns of Fort Ripley, Castle Pinckney, and White Point Battery. The three Confederate ironclads were also considered part of the inner harbor defenses, along with the spar-torpedo boats and *Davids*. These batteries, obstructions, and naval assets formed the second line, or inner harbor defenses. The utilization of the various points surrounding the inner harbor with earthen batteries, enhancement of the Middle Ground Shoal to create Fort Ripley, the pre-existing brick fortification at Castle Pinckney, and the obstructions of the main inner harbor channels, along with the mobile gun and torpedo platforms were designed primarily to defend against a naval assault on the city and harbor.

The next line of defense at the outer harbor encompassed the key terrain of Charleston Harbor. The defensive purposes of these positions were threefold: 1) to secure the Main Ship Channel, the anticipated Federal naval avenue of assault; 2) to protect the main blockading route into Charleston Harbor, Maffitt's/Beach Channel; and 3) to shield the throat of the harbor, the decisive terrain that the Confederates intended to hold at all cost. To the southwest on Morris Island were two strong fortifications at the north end of the island, Battery Wagner and Battery Gregg, along with a series of small earthen works on the south end of the island. These batteries, especially Wagner and Gregg, commanded the Main Ship Channel, the principal shipping route into Charleston before the war and the most probable avenue of approach for a Federal fleet to attack the harbor. To the east, on Sullivan's Island, a string of earthen works, anchored by Battery Marshall at Breach Inlet and Battery Beauregard at the harbor entrance, protected the main blockade running route in the harbor, Maffitt's/Beach Channel. Pivoting north the earthen batteries between Battery Beauregard and Battery Bee, encapsulating the brick-walled Fort Moultrie, guarded the throat of the harbor, or the main entrance into the harbor. Located across from Fort Moultrie and the channel was Fort Sumter, situated on a human-enhanced island. A series of obstructions that evolved over the years comprised of rope, wooden booms, and torpedoes, stretched from the shoals of Fort Sumter to Battery Bee. A gap between the shoals and Fort Sumter provided a passage for the blockade runners, harbor transports, and the Confederate ironclads. The throat or gorge of the harbor was the decisive terrain that the Confederates expended

significant labor, resources, manpower, and ordnance to protect. The Confederate ironclads presented another defensive barrier behind the line of obstructions spanning the throat of the harbor. The Confederate defenses comprised of earthen batteries, forts, obstructions, and warships evolved over the four years of the siege and successfully accounted for the coastal environment, surviving several attacks that tested but never broke the harbor defenses. Only the threat of an attack by Sherman in early 1865 forced the Confederates to abandon the city and harbor defenses.

The most prominent underwater natural feature of the battlefield was the ebb-delta complex that extended seawards from the harbor entrance out to the 18-foot contour line (mlw), and northeastwards roughly to Breach Inlet and southwestwards to Lighthouse Inlet. From the Union perspective, the 18-foot contour line, or along the eastern periphery of the ebb-delta complex at the entrance to Charleston Harbor, was initially chosen to station the fleet to enforce the blockade. The five channels through the shoals, Lawford, Main Ship, Swash, North, and Maffitt's/Beach, further dictated placement of the blockaders, as did the four smaller inlets, Dewees, Breach, Lighthouse, and Stono. The Federal occupation of Folly Island effectively closed the Stono and Lighthouse Inlets to blockade running activities. The arrival of monitors and the fall of Morris Island in late 1863 allowed the Union navy to push up and gain territory at the south side of the harbor channel entrance. Their presence increased the hazards to blockade runners entering the harbor, in fact, effectively closing the harbor for several months. A closeness to the Confederate defenses permitted more probing operations to contest the batteries and obstructions at the throat.

Observations and fields of fire from the Confederate perspective were achieved through the occupation of Fort Sumter; the walls standing sixty feet above the waters of the harbor afforded the greatest view of the battlefield sweeping from Dewees Inlet to Stono Inlet and out towards the station of blockaders. Several towers built on James and Sullivan's Island also offered a vantage point to view of Union movements on Morris and Folly Islands, naval movements on the Stono River, and the arrangements of the blockading fleet. The masthead of the wrecked blockade runner *Ruby* at Lighthouse Inlet provided a novel perch for a time to observe Federal movements. During clear weather, simply standing on the beach allowed an unobstructed view of the Federal fleet. The unobstructed view of the blockading fleet allowed for planning a blockade runner's departure from the harbor and for planning attacks on the fleet. From the Federal viewpoint, as the Confederates had unlimited views of the disposition of the blockading fleet, so too did the Union observers note the presence of fortifications, ship movements, and other harbor activity from their mastheads and forward observations posts at Payne's Wharf behind Morris Island. The occupation of Morris Island, especially after the fall of Battery Wagner and Battery Gregg, permitted unhindered observations of harbor movements and the obstructions.

Weather played an important role in the variability of each force's observations. Periods of rain and fog limited visibility and were taken advantage of by the Union monitors in approaching through the Main Ship Channel unseen by the Sullivan's Island defenses and Fort Sumter to begin launching fusillades against the Confederate defenses. The Union picket and scout boats also took advantage of limited visibility caused by rain, fog, and moonless nights by approaching and clearing the rope obstructions between Fort Sumter and

Battery Bee. Sometimes what can and cannot be observed is based simply on one's viewpoint on the battlefield. The Confederate ironclad sortie out of Charleston Harbor illustrates this perfectly. According to a Confederate participant's vantage point on one of the ironclads, the night was the clearest night in days and afforded an excellent view of the blockading fleet, causing a fear that the smoke from the steamer would give away their presence to the Union ships (Parker 1883:302). From the Union perspective, the night was hazy with limited visibility looking towards Charleston and Morris Island. In other words, the backdrop and the night mist of Morris Island enshrouded two Confederate ironclads belching bituminous coal smoke, allowing them to stealthily approach the Union blockaders, which were in perfect view to the attacking vessels. This scenario repeated itself when the Confederates were able to salvage the guns of the *Keokuk* a mile off Morris Island during the night under the noses of the nearby blockaders.

An important aspect of the Confederate defenses and the Union enforcement of the blockade and combat operations was the ordnance used by both sides to meet their objectives. Both sides relied on fixed positions and mobile platforms to move the ordnance to advantageous locations to increase the field of fire. Ranges of all heavy ordnance on both sides of the conflict were affected by the variables of the powder charge, projectile weight and type, elevation in degrees of the barrel, and in the physical height of the weapon on the ship or in battery. The four premiere Union naval pieces of ordnance were the 9-inch Dahlgren smoothbores, 11-inch Dahlgren smoothbores, 15-inch Dahlgren smoothbores, and the 100-pounder Parrott rifle. The 9-inch Dahlgren smoothbores fired a 72.5-pound shell at a point blank range of 350 yards to a maximum effective range of 3,450 yards. The 11-inch Dahlgren smoothbores fired a 136-pound shell at a point blank range of 340 yards to a maximum effective range of 1,700 yards. The 15-inch Dahlgren smoothbore fired a 350-pound shell at a point blank range of 300 yards to a maximum effective range of 2,100 yards. The 100-pounder Parrott rifle gun firing a solid shot weighing 100-pounds at elevations between 5° to 25° went between 2,200-6,910 yards, or 1.25-3.9 miles. An important strategy of the blockaders was to use picket boats equipped with 12-pounder or 24-pounder boat howitzers to operate within the harbor throat during the night to thwart the entry and exit of blockade runners. The 12-pounder boat howitzer fired a shell weighing 10 pounds at a point blank range of 70 yards to a maximum effective range of 1,085 yards, although the captain of *Patapsco* mentions pitching shells over 2,700 yards, certainly an extreme range. A 24-pounder boat howitzer firing a 20-pound shell had a point blank range of 280 yards to a maximum effective range of 1,270 yards (USN 1866:Appendix B xiv-xvii). The mobile ordnance platforms permitted the Union fields of fire to move about the battlefield to enforce the blockade and to position themselves to effectively fire at the various Confederate fortifications. Night increased the Union's ordnance reach by pushing closely to the main blockading route of Maffitt's Channel and to operate within the critical Confederate terrain at the throat of the harbor.

The premiere Confederate heavy ordnance was the 6.4-inch and 7-inch Brooke rifles. The 6.4-inch Brooke at 0° elevation had a range of 748 yards and at a 23° elevation had a range of 6,000 yards (SCHS-Johnson). The 7-inch Brooke rifle fired a projectile for more than four and a half miles, or 7,920 yards. On 9 January, 1864 a Brooke rifle, presumably a 7-inch, pitched a shell weighing 100-pounds approximately four miles, or 7,040 yards, into

the Federal camp at Lighthouse Inlet from Fort Sumter (Katcher 2001:20-21). Battery Marshall, located at Breach Inlet, guarded the approach of the main blockading route into and out of Charleston. A listing of the heavy guns on 6-7 April 1864 at the battery included an 8-inch Navy smoothbore, an 8-inch Columbiad smoothbore, a 32-pounder smoothbore, and a 7-inch Brooke rifle. The 8-inch Navy, 63 cwt, had a maximum effective range of 1,770 yards. The 8-inch Columbiad when elevated to 27.3° fired at a range of 4,812 yards. The 32-pounder, depending on cwt of between 27-57, had a maximum range of 1,637-2,731 yards (*ORA*, ser. 1, vol. 35 (part 2):415, 465; USN 1866:Appendix B. no. 3 xiii; Manucy 1956:52).

The other preferred Confederate weapon delivery system besides using long-range projectiles was to deliver close-action strikes against the Union fleet. The invention of the spar-torpedo allowed for unconventional watercraft to engage a blockader at close quarters to administer the blow. The night also assisted in cloaking the approach of these vessels. The successful detonations on *New Ironsides* by a *David* and on *Housatonic* by the submarine *H. L. Hunley* reflect the success of this approach. Counter-measures by the Union navy helped to preserve the monitors of the inside blockade, and a change in the protocol of anchoring to steaming, or to send out patrol launches when anchored, at night helped the outside blockade vessel's avoid another attack. The other close-contact weapon, torpedoes, helped keep the Union at bay, whose apprehensions of these devices were confirmed when *Patapsco* was sunk during torpedo clearing operations. The sinking affirmed to the Union navy the danger of the obstacles at the throat of the harbor. The captain of the monitor *Canonicus* mentioned the example of the sunk *Patapsco* before his eyes when steaming carefully to Fort Moultrie to verify the abandonment of the Confederate defenses in February 1865. The Confederate ironclads also employed a more direct weapon delivery system by employing the methods of the Ancient Greeks and Romans by ramming their vessels into the sides of two Union blockaders.

The fixed emplacements of the Confederates dictated many of the Federal naval actions. When selecting the placement of the Second Stone Fleet, Du Pont ordered the naval commander in charge to sink them out of range of the Confederate batteries. To negate the effectiveness of the fixed positions the Federal navy used the concealing nature of the night to move closer to Sullivan's Island in their efforts to close Maffitt's Channel to blockade running traffic. The incident of the blockader *Pontiac* receiving a destructive shot on the bow was a result of not quickly moving out of range from Battery Marshall as day broke. Nowhere on the battlefield was the combination of batteries and guns better arranged to prevent the Federal navy from entering than at the throat of the harbor. The two-and-a-half hour iron projectile beating the ironclads took on 7 April 1863 was a combination and culmination of Confederate preparations to stop such an invasion.

During the 7 April 1863 ironclad assault on Fort Sumter, Beauregard ordered the batteries on the north end of Morris Island to let the fleet pass unhindered up the Main Ship Channel. Beauregard disregarded the maxim of engaging the enemy from a distance as he felt confident that the defenses girdling the throat of the harbor would halt the fleet's progress. The concentric fire from Fort Sumter, Fort Moultrie, and the batteries on Sullivan's Island, joined by Battery Wagner and Battery Gregg on the north end of Morris Island, directed their fire at the monitors, forcing a withdrawal following two hours and a

half of sustained and effective fire. Despite ignoring the above referenced maxim, Beauregard apparently utilized the key terrain to perfection, including channeling the enemy into a desired location. Captain Rhind, formerly of the *Keokuk* sunk after the battle, while meeting with Fox and Lincoln to report the news of the failed assault, remarked after Fox had mentioned the British fleet during the Crimean War had successfully taken Sebastopol armed with 120 guns:

...if Sebastopol had 120 guns, Charleston has got 1,200 guns. Not in point of numbers, mind you, but in point of strength of position, weight of metal, caliber, and service of batteries...give Charleston a strength equal to 1,200 guns, and you will never take the place with a monitor fleet (*The New York Times* 5 February 1893).

Concealment and cover in Charleston Harbor was fairly difficult to accomplish in the natural environment. The expanse of the ocean during the day and on moonlit nights afforded observing the Union fleet offshore. Fog, inclement weather, and moonless nights afforded the only natural means of concealment offshore. On land, the low, sandy barrier islands, particularly along the shoreline, precluded stealthy movement during daylight hours. Usually any visible movement drew the attention of a land battery or naval vessel to lob a few rounds in that direction to dissuade further actions. The primary means to obtain cover and concealment were through military engineering to construct entrenchments and bombproofs as both sides attempted to provide cover during bombardments from land and sea. Direct assault failed twice on Battery Wagner, and the military engineering solution was to go underground and sap their way to the battery. Cover was afforded to the Union sappers by the rolling sap, as well as the naval guns of the monitors and *New Ironsides*. The naval engineering solution for attacking the Federal fleet of blockaders was to devise semi-submersible *David's*, and the first successful combat submarine, *H. L. Hunley*, to approach as stealthily as possible during the night before planting a spar torpedo on the side of the blockader. The blockade runners based their runs through the blockade during moonless and foggy nights. Additionally, having their hulls and upper works painted a light gray or blue allowed a blockade runner to blend in with the night. As mentioned previously, Confederate movements in front of Morris Island blinded the Union blockaders to the attack of the ironclads and salvage of the *Keokuk* guns.

Beauregard was quoted as saying he had more faith in rope obstructions and one torpedo than five 10-inch Columbiads. The passive and explosive obstructions placed at the throat of the harbor and along the secondary areas of defense were meant to halt and impede the Union navy's progress into Charleston Harbor. The physical presence of these obstacles, or threat of them, was a key factor in forcing a stalemate off Charleston. Union scouts, Confederate deserters, contrabands, and the wreckage of these obstructions washing ashore following storms attested to Du Pont and Dahlgren the Confederate efforts to close the harbor entrance to the Union navy. The 7 April 1863 ironclad attack sputtered at the threat of torpedoes when *Weehawken's* captain balked at forcing the monitor through the obstructions, believed to be torpedoes. And as remarked upon by Major Johnson, there were no torpedoes in the harbor at that point until early-July. At no point was the obstruction line crossed between Fort Moultrie and Battery Bee by the Union navy, despite having a 300 yard gap

between the shoals of Fort Sumter and the southern extent of the impediments. Union efforts were directed at probing the defenses, and cutting and destroying the rope obstructions, which were quickly replaced by the Confederates. The indecisive probing of the obstructions resulted in the loss of *Patapsco* during the waning days of the siege. While clearing torpedoes, it struck one and sank to the bottom.

Tides were used by the combatants for varying purposes at the harbor. The ebb-tide was used to help propel Confederate semi-submersibles and submersible out of the harbor to attack the Federal blockaders on several instances. Glassell with a spar-torpedo boat rowed out on an ebb-tide during a failed attack on *Powhatan* (Glassell 1877:227). Glassell brought the *David* out on an ebb-tide and the attack on *New Ironsides* was made on the flood tide to aid the vessel's return to the harbor. *Hunley* went out on an ebb-tide, and speculation about the demise of the submarine suggests Dixon was waiting for the tide to turn before attempting to return to the harbor. In each instance, the power of the ebb-tide, the more powerful of the tides, and going in the right direction—at the blockading fleet—was used as an auxiliary motive power. The Federal fleet used the ebb-tide for a different purpose during the 7 April 1863 assault. Instead of intending to carry the monitors to the enemy, the ebb-tide was chosen as the time to attack in case a monitor became disabled; the tide would carry them out of the harbor and away from the city to avoid capture. The flood tide with moonless nights was the primary time for blockade runners to make the attempt to evade the blockade. The senior naval officer off Charleston wrote to Du Pont, "The tide is about half an hour of being full and we are keeping an awfully sharp lookout about this time. We don't sleep much here you know, except at low water" (*ORN*, ser. 1, vol. 13, 419).

The flux of the tides also presented variable conditions to contend with. Throughout the Morris Island campaign the various stages of the tides in the Main Ship Channel caused the vessels to swing at anchor and orient themselves broadsides to the channel, pointing directly towards Morris Island. This proved troublesome for *New Ironsides* with its unprotected bow and stern while bombarding Battery Wagner and Battery Gregg on the north end of Morris Island (*ORN*, ser. 1, vol. 14:599). The tides, and wind, also influenced the effectiveness of the blockade. In one instance, the bow of *Flambeau* was pointed out to sea, while the blockade runner *Minho* slipped in from behind unseen. In another case, the tidal currents added an additional degree of difficulty of aiming at blockade runners as attested to by *Patapsco*'s captain while firing on a sloop at Fort Moultrie.

Battle Episodes

Applying the KOCOA scheme to the specific naval battle episodes helps to illuminate the interpretation of each action in light of the overall strategic use of the battlefield (Figure 61). The similarities and differences in using the physical environment and conditions to meet various objectives provide additional insights to the naval actions on the battleground. The Confederate naval sequences were directed primarily at the wooden blockaders, although a premeditated and successful attack on *New Ironsides* were directed at a primary Union offensive warship. The Union naval actions were mostly attempts to battle against the Confederate fortifications in a bid to ultimately enter the harbor. The blockaders and blockade runners will be discussed together as their actions were a continuous series of

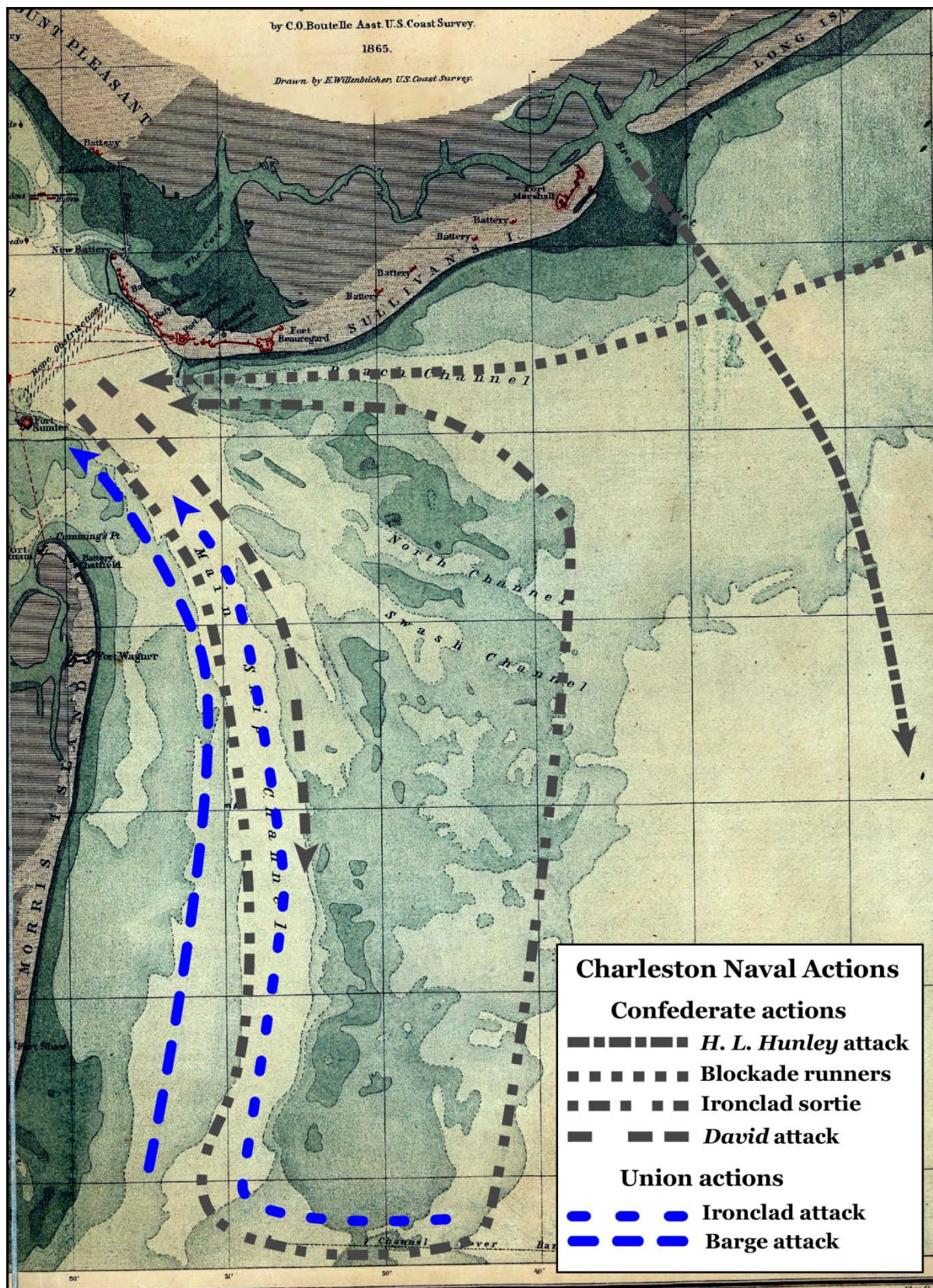


Figure 61: Charleston Harbor naval battle episodes (US Coast Survey 1865; SCIAA graphic).

actions and evasions. This section will conclude with a brief analysis of the corresponding and different characteristics of the naval actions.

The Confederate ironclad sortie was an attempt to strike at the wooden blockaders at their stations off Charleston Harbor. The ironclads departed Charleston Harbor via the Main Ship Channel and crossed over the bar using the Pumpkin Hill Channel at flood tide. The ironclads were concealed by darkness and the backdrop of Morris Island. Additionally, each was painted a bluish color to blend in with the night. Using a combination of ramming and heavy ordnance, the ironclads attacked the wooden blockaders and disrupted the Union fleet for several hours. The ironclads were spotted by the Union blockaders, but not in enough time to adequately prepare to fend off the attack. The ironclads then proceeded northeasterly along the eastern edge of the ebb-delta complex, essentially along the line of blockaders. The Confederate warships engaged in a running duel with the Federal blockaders until reaching Maffitt's/Beach Channel. Low tide forced the ironclads to wait for the flood tide under the shelter of the Sullivan's Island batteries facing the channel. Ultimately, the ironclad sortie proved an ephemeral victory as the Union blockaders resumed their stations shortly after the action.

The *David* was concealed by the night and a low profile as it attacked *New Ironsides*. The Confederate semi-submersible departed the harbor and hugged the eastern side of the Main Ship Channel as it moved on the outer edge of the inner blockaders. The vessel had departed on an ebb tide and waited to attack at the turn of the tide to assist in its withdrawal back to the harbor using the same route. The semi-submersible was hailed by the watch of *New Ironsides*, and both vessels engaged in a small arms duel until the explosion of the torpedo. The resulting blast of water nearly proved disastrous to the attacker, although two of the four crew members were able to bring the vessel back into the harbor, while the other two were captured after jumping from the craft.

The submarine *H. L. Hunley* made an opportunistic strike at the wooden blockading vessel *Housatonic* stationed at the entrance to North Channel. The submarine departed Breach Inlet during the night on an ebb-tide. The submarine apparently employed a series of dives and surface cruises to approach within striking range of the blockader. The submarine was spotted and fired upon by small arms fire, but not in enough time for the larger guns to fire on the vessel. While the submarine successfully planted and detonated the spar torpedo against the hull of the Union blockader causing it to sink, the *Hunley* was lost in action with all hands.

The Union ironclad attack on Fort Sumter occurred during the day, offering Confederate gunners a clear shot at the ironclads, although occasionally obscured by the smoke of the guns. The ironclads depended on impregnability and not concealment to affect their objective of reducing the fort. The ironclads crossed the bar on a flood tide using the Pumpkin Hill Channel and then steamed to the throat of the harbor using the Main Ship Channel. They approached the throat of the harbor on an ebb tide, became disorganized in their attack formation, and then endured two-and-a-half hours of cannon fire from the Confederate batteries. The ironclads withdrew from the harbor to the south end of the Main Ship Channel abreast the southern end of Morris Island.

An interesting battle phenomenon called “bunching,” resulting from a loss of tactical cohesion, expounded by Fox in regards to the collapse of Custer’s regiment at the Battle of the Little Bighorn on 25 June 1876, offers some insights in analyzing the failed Union ironclad attack. A loss of tactical cohesion occurs when the command structure begins to disintegrate from unit actions into individual ones. As Fox quotes “...it is toward disintegration of human groups that battle is directed.” During the disintegration process from stability to chaos in combat, men seek leadership and will crowd, cluster, or “bunch” as fear sets in and a man seeks mutual protection as a group, around a perceived leader, or near the strongest weapon (Fox 1993:10-11; 46-52). Based on reports, the Echols’s map, and comments by Confederate Major Johnson on a commemorative illustration of the attack, appears to demonstrate a case of naval “bunching” occurring during this attack. The ironclad assault column proceeded in an orderly manner up the Main Ship Channel and turned into the throat of the harbor aiming to reach an easy distance from which to pound Fort Sumter. The van was lead by *Weehawken* pushing the anti-torpedo raft, and when the captain perceived the ironclad had reached a dangerous proximity to the Confederate obstructions, reportedly consisting of torpedoes, ordered his vessel to turn broadsides to Fort Sumter, and bows on to Fort Moultrie. Here began the transition from stability to disintegration of the attack fleet. *Weehawken*’s turning caused the ironclads behind to turn to avoid colliding into each other. This was further compounded in the middle of the line with the unmanageable flagship *New Ironsides*, which did in fact collide with two monitors in the rear. Unable to steer and to engage its broadsides effectively, Du Pont signaled to the fleet “Disregard flagship.” The loss of tactical cohesion combined with the abdication of leadership now turned the affair from a fleet of ironclads attacking the fort to individual monitors battling it out and essentially degenerated into every ship for itself. *Keokuk* stormed to the front and became the focal point of Confederate fire. The experimental ironclad endured an unprecedented fire that during optimistic times was looked forward to by the papers which had commented “No ship of her shape had been under fire, and the scientific world will await with interest her conduct in battle.” A day later the riddled vessel sank off Morris Island and the scientific community had its answer—not well. The breakdown in the command structure from the battle unit to the individual ship is observed in the phenomenon of bunching as described by Fox. The after-action illustration by Echols of the battle shows the clustering of the ironclads in a group (See Figure 7). Major Johnson, at Fort Sumter during the battle, made notations and corrections on a commemorative illustration of the attack some time after the war. Johnson repositioned the drawn ship’s positions and placed them in a tighter cluster (SCHS-Johnson). Captain Percival Drayton in *Passaic* reported his monitor was, “...in the crowd of vessels which were all around and under so fierce a fire.” *Montauk*’s captain stated the difficulty in steering the monitor “...which was difficult to do in avoiding the other vessels...the vessels of the fleet close around me” (*ORN*, ser. 1, vol. 14:10, 13-14). The fact the monitors did not withdraw pell-mell until ordered or disabled is testimony to the bravery of the officers and crew in withstanding a fire never before experienced by mankind. The effectiveness of the naval assault was blunted by the lack of leadership and compounded by the unrelenting heavy caliber projectiles knocking on their turrets, pilothouses, decks, and side armor. There was no Farragut exclaiming “Damn the torpedoes, full speed ahead,” only silence and flags on the shrouds fluttering in the wind of the impotent flagship as the battle raged.

The naval barge attack relied on the night to conceal their descent on Fort Sumter. The barges or small boats were towed from the rendezvous point at Lighthouse Inlet and towed up the Main Ship Channel before casting loose off Cummings Point and heading towards Fort Sumter. The tide was probably on the last stages of the ebb as the column approached the fort (Gillmore 1888:65). Following the brief unsuccessful attack, the Union barges withdrew using the same route.

During the Morris Island campaign the monitors and *New Ironsides* were located in the Main Ship Channel near or abreast Battery Wagner and Battery Gregg. The times of attack varied and occurred throughout the night and daylight hours and tides as well. As mentioned above, the monitors and *New Ironsides* relied on their armored protection to engage the batteries at close range, while the wooden warships maintained a more respectful distance. The rising tide permitted the monitors to press the attack, as evidenced when the monitor *Montauk* approached within 300 yards, or point blank range, of Battery Wagner. When breaking for action the monitors proceeded down the Main Ship Channel to the south end off the southern end of the island. When the island was finally captured the monitors and *New Ironsides* were able to maintain a station closer to the harbor throat near Cummings Point.

The various naval attacks on Fort Sumter occurred at diverse times and tides. The Confederates noted one of the nearest approaches to the fort by the monitors occurred during a fog which enshrouded their approach. Again, the armor plating permitted the ironclads to venture and attack Fort Sumter and to engage the Sullivan's Island batteries, where no conventional warship would survive for very long. The monitors approached Fort Sumter from the Main Ship Channel around Cummings Point and into the throat of the harbor, usually attempting to keep out of effective range of the Sullivan's Island batteries. The monitors would position themselves depending on which angle of the fort they were seeking to destroy. The monitors withdrew in the reverse to their anchorage in the Main Ship Channel off Morris Island.

The Union blockaders maintained their stations off the channels through the Charleston bar and nearby inlets. These stations were maintained with few exceptions, especially as the vessel numbers increased, every day, regardless of weather or sea conditions. Early during the blockade the Union attempted to augment the floating blockading vessels with sunken ones to obstruct the two primary channels, Main Ship and Maffitt's/Beach Channels, into the port. The closing of the Main Ship Channel, and Lawford in consequence, by the First Stone Fleet proved the most effective, primarily as this was the area of offensive actions against Morris Island utilizing the monitors and *New Ironsides* operating within the Main Ship Channel. Maffitt's/Beach Channel then became the primary evasion route by the blockade runners. The presence of the Second Stone Fleet and the Union blockaders forced the evaders to run between the stone fleet and the breakers of the beach to reach the inner harbor, and run in reverse in a bid to go to sea. A series of Confederate batteries on Sullivan's Island capable of sending shell and shot several miles in distance served as a protective buffer to keep the Union blockaders from encroaching too close to this important route. Environmental conditions of dark and moonless nights, high tides, fogs, and rains favored the blockade runner, typically painted in a color scheme of light

gray or blue to blend in with the evening. The blockaders attempted to conceal themselves by covering any visible lights and by moving about to prevent accurate pre-positioning of the fleet by blockade runners attempting to run the blockade. The use of small launches during the night, including monitors and tugs to convey heavier ordnance, helped to enforce compliance of the blockade.

Each of these naval actions was fought on the same battleground and therefore exhibits a number of commonalities to each other with few exceptions. Most of the battle episodes were fought at night; in fact all of the Confederate actions were precipitated in the darkness—blockade running and attacks upon the blockaders. The nature of the coastal environment of low barrier islands and the limitless view from the beaches, mastheads, walls of Fort Sumter, and to the horizon during optimal days necessitated a need for the cloak of darkness for surprise attacks. This was especially needed in light of the Confederate spar-torpedo weapon delivery system which required contact with a vessel. Only the Federal ironclad attacks on the Confederate batteries were accomplished in the daylight due to their armor plating, although the obscurity of night was used on occasion. Another important consideration was the states of the tide—ebb or flood. The ebb was the preferred tide of the two Confederate vessels *David* and *H. L. Hunley* to assist in the motive power to bring them to the blockaders and then later rely on the flood to withdraw to the safety of the harbor. Most of the larger ship actions took place on the flood to permit these vessels to cross the bar and navigate in the channels, as did blockade runners to lessen the margin of error in navigating the shallow waters. In the case of the 7 April 1863 ironclad attack, the ebb was relied upon to draw a disabled Union warship out of the harbor. The primary avenue of attack and withdrawal was the Main Ship Channel by both combatants. The Confederate ironclads sortied out of the harbor from it, and *David* and *Hunley* in hunt of monitors and *New Ironsides* employed the channel as well. All Union naval attacks on the Confederate fortifications relied on the Main Ship Channel from which to bombard or to transit to the throat of the harbor to engage Fort Sumter and the Sullivan's Island batteries. The only instance of an offensive action occurring elsewhere is when *Hunley* used Breach Inlet to attack the north line of the blockade. Maffitt's/Beach Channel, used as the avenue of withdrawal for the Confederate ironclads, was the primary channel for the blockade runners. The following section presents the context of the Union and Confederate shipwrecks as these represent the physical manifestations of the naval actions on the battlefield.

Battlefield Casualties

The locations of the Confederate and Union shipwrecks on the battlefield attest to the intensity of fighting occurring at the harbor and exhibit the patterns of the ongoing siege at Charleston (Figure 62). The Federal shipwrecks on the battlefield are three ironclads, *Keokuk*, *Weehawken*, and *Patapsco*, and the wooden blockader *Housatonic*. The wrecks of *Keokuk* and *Patapsco* represent the efforts of the Confederates to protect the key and decisive terrain of the harbor throat and the Union efforts to force and probe the entrance. The sinking of *Keokuk* at the south end of Morris Island and the southern terminus of the Main Ship Channel corresponds to the safest position that the vessel could take to stay within shallow water and beyond the accurate reach of the heavier ordnance located at Battery Gregg and Battery Wagner in the spring of 1863. The remains of *Patapsco* symbolize the

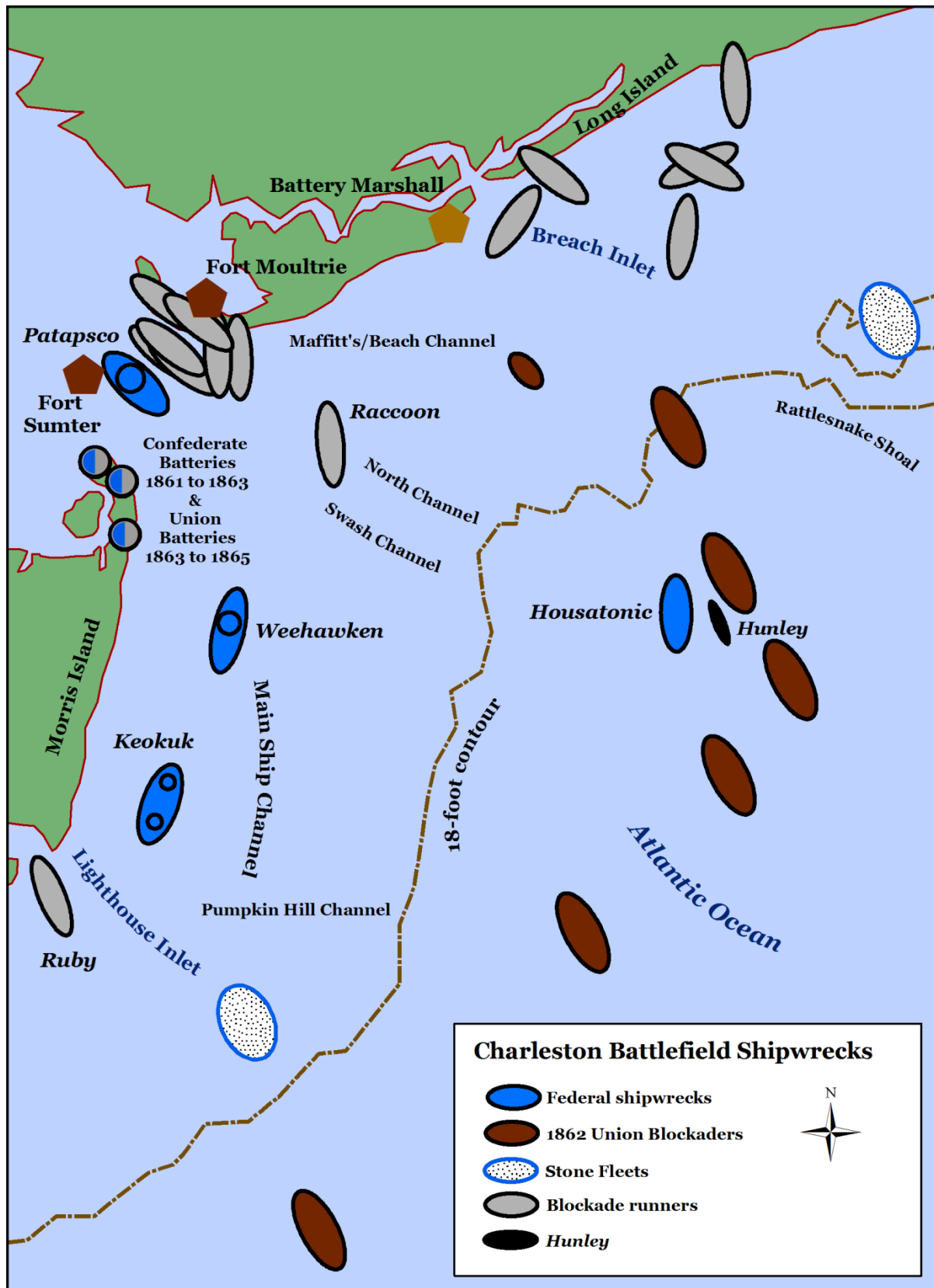


Figure 62: Position of Union and Confederate shipwrecks in relation to coastal terrain, bathymetry, and georeferenced 1862 positions of Union blockaders (SCIAA graphic).

effectiveness of the Confederate efforts to prevent the Federal navy from entering the throat of the harbor by obstructing it with torpedoes and other contrivances. This was the furthest limit a monitor, the main Federal naval weapon, managed to reach in the harbor. The position of *Weehawken* in the Main Ship Channel indicates the inside blockading station the monitor was anchored at during the sinking. The monitor was also in a rear and supporting position to the lead picket monitor off Cummings Point. The *Housatonic* was the sole victim of Confederate attempts to sortie out of the harbor and attack the wooden blockaders. The remains of *Housatonic* juxtaposed to the 1862 blockading stations indicate the station the blockader was anchored at during the night of 17 February 1864. The remains of the *H.L. Hunley*, while marked on the map, no longer reside on the battlefield since recovered and is now undergoing preservation in North Charleston. The known position of the First Stone Fleet and the presumed general area of the Second Stone Fleet signify the efforts by the Union to obstruct and close the two major routes into Charleston.

The Confederate wrecks are limited to the blockade runners attempting to run the blockade. The remains of the blockade runners are in two clusters with two outliers, and all represent their efforts to elude the blockaders to enter and exit the harbor via Maffitt's/Beach Channel. The first cluster, off the Isle of Palms/Long Island, is comprised of six wrecks. All of these wrecks were victims of the Outer Blockade and were attempting to run on the inside of the blockaders and the Second Stone Fleet and hug the shoreline to exit or enter the harbor. The vessels came to grief through accidental and intentional groundings, oftentimes with large caliber projectiles headed their way in the darkness. The second cluster, composed of seven wrecks, at Fort Moultrie and Bowman's Jetty on Sullivan's Island, represent victims of the Inside Blockade. They either were on their way to sea or inward bound after successfully passing the Outer Blockade. The next gauntlet was the Inside Blockade that was patrolled by small Union launches and the monitors, and the ships accidentally or intentionally grounded while attempting to elude their pursuers. Of the two outliers, *Raccoon*, accidentally grounded while inward bound, was escaping gunfire from the Union blockaders, while *Ruby* had lost its bearing in the night while inward bound and grounded at Lighthouse Inlet. Both were attempting to enter the harbor via Maffitt's/Beach Channel.

The illustration clearly shows a pattern to the locations of the Union and Confederate shipwrecks. The Union vessels are located to the south of the harbor, reflecting their occupation of Folly Island and Morris Island. The remains of *Housatonic* beyond the 18-foot-contour indicate its position on the line of wooden blockaders attempting to enforce the blockade. The stone fleet locations were both designed to obstruct the two main routes of the harbor. The two clusters of blockade runners clearly reveal the main blockading route into and out of Charleston and attest to the natural and military dangers of navigating that channel. The *Ruby* wreck seems to contradict the effective closing of the Main Ship Channel by the presence of the monitors and the First Stone Fleet but was in reality just lost in the night that so ably shrouded the vast majority of blockade runners that successfully ran the Union blockade.

The Battlefield Today

Without too much difficulty a participant from either side returning to the scene of the conflict would recognize many of the prominent natural, cultural, and military features remaining at present-day Charleston Harbor. The principal islands of Isle of Palms (Long Island), Sullivan's Island, Morris Island, and Folly Island, punctuated by the inlets of Dewees, Breach, Lighthouse, Stono, and the harbor entrance, still serve as references to the coastline of Charleston. James Island, Mount Pleasant, and the city, surrounded by the Ashley and Cooper Rivers, continue to shape the inner harbor. Cultural features remaining include the steeple of St. Michael's Church yet protruding above the city's skyline, used as a range marker for Union artillerists, along with several other steeples, and the sea wall point of the city at The Battery, or White Point Gardens still projects into the inner harbor waters. Fort Sumter and Fort Moultrie remain as sentinels at the throat of the harbor, and Castle Pinckney looms behind them inside the harbor. But time has not stood still in Charleston and the built-up environment has enveloped these natural, cultural, and military features of the battlefield.

The beaches of Isle of Palms, Sullivan's Island, and Folly Island are now lined with beach houses and not batteries that have eroded into the ocean or have blown away by the wind. The city has developed into a modern port city, with several high-rise buildings competing for views with the church steeples, although these structures are all dwarfed by the 175 m (575 ft) tall Arthur Ravenel Jr. Bridge spanning the Cooper River from Charleston to Mount Pleasant. Huge container ships and Roll-on/Roll-off ships line the dock areas once frequented by blockade runners on the Cooper River. Castle Pinckney remains in the harbor, but abandoned and obscured by trees that cover the brick structure and not sandbags. Fort Ripley's presence is noted by a navigational sign warning of shallow water and by bricks and rocks that become visible during low tide. Fort Johnson now houses the SC Department of Natural Resource's Marine Resources Division and other marine biological-oriented facilities. Near-by Fort Sumter, shorn of its height from the Federal bombardments, and the rubble since cleared, still receives small harbor vessels loaded not with soldiers and supplies, but with tourists interested in the fort and its place in Civil War history. Perhaps, only the brick structure of Fort Moultrie remains true to form, although like Fort Sumter, was pressed into defending the harbor for subsequent wars and modernized during the 1870s and during World War I and II with concrete and earthen bunkers for protection.

A Union or Confederate naval officer or sailor, or a captain of a blockade runner, looking over the sheet of water of Charleston Harbor would recognize the sweep of the coastline to the northwards to Dewees Inlet and southwards to the Stono Inlet, the throat of the harbor, and into the inner harbor with the Ashley and Cooper Rivers in the distance. But, if trying to navigate their blockading vessel or blockade running vessel into the harbor, they would find profound differences to the submerged terrain. Here is where the greatest changes to the battlefield have taken place from a naval viewpoint. The underwater terrain has been altered through the placement of two stone jetties at the harbor entrance. Built from 1878 to 1896, the Charleston Harbor entrance jetties were a coastal engineering project designed to maintain a deep channel through the ebb-delta complex seawards into the inner harbor. The jetties were placed on either side of the North Channel and in alignment with the

harbor gorge, the north jetty starts at Sullivan's Island and the south jetty on Morris Island, at the approximate location of Battery Wagner. Both extend seawards for about 4.4 km (2.7 mi). The creation of the Charleston Harbor Jetties formed a more direct shipping route to the port, when compared to the old Main Ship Channel which drifted in a southerly direction along Morris Island before turning out to sea. The creation of the jetties had a profound effect on the underwater topography and nearby sea islands.

The jetties reformed the North Channel from a secondary channel into the primary shipping channel into Charleston Harbor (City of Charleston 1883:498-499). The jetty placement also incorporated the Swash Channel as well. The two main channels into the harbor during the Civil War, Main Ship Channel and Maffitt's/Beach Channel, no longer exist as they once were. Maffitt's/Beach Channel has been effectively closed by the north jetty at Sullivan's Island, while a breach in the south jetty permits small pleasure boats and shrimp boats access to the remnant of the old Main Ship Channel. Besides impacting the historic channels into the harbor, the jetties have also impacted the ebb-delta complex. To the north, the jetty impedes the longshore transport of sediments southwards along the coast, causing them to accrete at and off Sullivan's Island and at the south end of the Isle of Palms. This is evident from the location of the wrecked blockade runner *Stonewall Jackson* now lying under the first dune line on the south end of the Isle of Palms. This has also caused the movement of the 18-foot contour line further seaward than during the siege of Charleston (Fitzgerald et al. 1979:657). At the southern side of the ebb-delta complex at the Main Ship Channel, the jetties have caused most of the channel to infill with sediments, except that section nearest the gap in the south jetty. Both the wreck sites of *Keokuk* and *Weehawken* have been buried deeper by the accretion of sediments. Additionally, the 18-foot contour line moved further seaward (Fitzgerald et al. 1979:657-658).

The islands at the base of the two jetties have been affected differently. Sullivan's Island is prograding seaward, while Morris Island is retreating into the marsh, and its northern spit, Cummings Point, is accreting into the harbor (Fitzgerald et al. 1979:642-643). Sullivan's Island had been accreting prior to the war, but after building the north jetty, accretion rapidly accelerated with a series of prograded beach ridges and vegetation (Fitzgerald et al. 1979:649-650). This is evidenced by overlaying the 1865 nautical chart that depicts the blockade runners at Fort Moultrie on modern nautical harbor charts and aerial photographs that suggest the wrecks are now lying some distance under the beach. At the south base of the jetty, Morris Island had been eroding for years before the war, especially at the north end, but with a slower rate near Lighthouse Inlet. Erosion of the beach and island was even commented upon in reports during the siege of Battery Wagner. This pattern reversed when the jetty was completed and the south end dramatically eroded and the north end at Cummings Point began accreting (Fitzgerald et al. 1979:65-651). Remarkable changes to the south end of Morris Island are discernible by the presence of the Morris Island Lighthouse completed in 1876, originally built on land; it is now surrounded by water and approximately 320 m (350 yd) offshore.

Changes have also impacted the Civil War-era channels of the inner harbor. The Main Ship Channel heads straight from the gorge of the harbor to the terminals located on the Cooper River side of the city. This channel passes through the unnamed channel, once

obstructed with a frame torpedo, that passed between Castle Pinckney to the east and entered the west end of Hog Island Channel. A channel is also maintained through the Ashley River and is part of the Atlantic Intracoastal Waterway. The old entrance to the Cooper River is seldom used by deep-draft vessels and is now more of a route for pleasure boats and lighter draft vessels to transit. Hog Island Channel is used as a means to access Shem Creek at Mount Pleasant, mostly navigated by pleasure boats and shrimp boats and other fishery vessels.

Another important agent of change to the maritime landscape has been the many dredging operations to widen, deepen, and maintain the navigation channels for shipping in the harbor. Two areas of the harbor altered by navigation improvements have occurred between Fort Sumter and Fort Johnson and on Morris Island. In 1962, dredging operations at the Rebellion Roads anchorage deposited a large amount of dredge spoil between Forts Johnson and Sumter from approximately 1962 until 1966 (*The News and Courier* 8 March 1962, 22 December 1967). The results of the influx of sediments created an island where none existed before and now almost connects the island fortress to James Island. In 1967, the US Army Corps of Engineers, Charleston District and South Carolina States Port Authority identified a 703-acre tract on Morris Island for depositing dredge spoil from the Rebellion Roads anchorage after the closure of the dredge spoil area between Forts Sumter and Johnson (*The News and Courier* 22 December 1967). The results of depositing the dredge spoil has increased the height of the island, as well as intermixing the original sediments of fine beach sand used to construct the Confederate and Union batteries with harbor bottom sediments (*The Post and Courier* 12 July 2010).

An additional by-product of the jetties construction and dredging operations has been the alteration of the tidal flow through the ebb-delta complex at the harbor entrance. The ebb and flow of the tidal fluctuations at the harbor, once relied upon by Confederate stealth craft for motive power, have been completely altered. The force of the tides no longer flow among the various channels at the entrance but are rather forced through the harbor jetties before meeting at the sea opening. The longshore current sweeping down the coast from the north is impeded by the north jetty, while the south jetty has altered the flow through the Main Ship Channel, where USS *New Ironsides* found it difficult at times to present its broadsides at Battery Wagner due to the currents.

In summation, the military considerations to defend and to attack were constrained by the natural, cultural, and military features Charleston Harbor. The Confederate forces, as the “home team,” had a decided advantage due to local knowledge and determination to hold Charleston. Waxing and waning Union military objectives also provided the important element of time for the Confederates to augment these three features to their advantage. Earthworks equipped with heavy ordnance and obstructions at key terrain stymied Union efforts to take the harbor. Apparently, the Confederates correctly applied the principles known as KOCO in their defense of the harbor. Operating on a more fluid environment, the Union navy faced many weather and sea inconstants, i.e., tides, sea states, night, fogs, etc., in their efforts to enforce the blockade. Launching their offensive actions against Battery Wagner and Fort Sumter, again not only contended with the natural conditions of the harbor, but also the military features that were expertly placed to deny a successful incursion

into the harbor. Some of the terrain features remain the same from the siege, but the greatest change was wrought on the unseen, but hardly neglected, underwater terrain that impacted fleet movements to meet military objectives.

Chapter 5 Conclusions and Recommendations

Introduction

The purpose of this project was to define and delineate the Study Area, Core Area, Defining Features, and the Potential National Register Boundary of the Charleston Harbor Naval Battlefield through historical and archeological documentation. The Study Area boundary of the naval battlefield was defined through examining the historical records that determined the battleground as comprehended by the combatants stretched along the coastline north from Dewees Inlet to the south at Stono Inlet, east to just beyond the 18-foot contour line, extending through the throat of the harbor entrance bounded by Fort Sumter and Fort Moultrie, and to either side of the Ashley and Cooper River waterfront of Charleston. The Study Area encompassed the various natural, cultural, and military features of the battlefield landscape including the Union blockading stations, Confederate blockade runner routes, coastal batteries and fortifications. Within the Study Area were the Core Area and Defining Features of the naval battlefield. The Core Area of the battlefield is where the major naval actions occurred, including the Confederate ironclad sortie on 31 January 1863, the 7 April 1863 ironclad assault, the sinking of *Housatonic* by the *H. L. Hunley*, and the enforcement of the blockade. The archeological manifestations of the conflict, wrecked blockade runners, sunken Federal ironclads, the remains of the first successful combat submarine and victim, provide testimony to the battle events that occurred within the Core Area boundaries and represent the cultural aspects of the Defining Features of the battlefield. The Core Area also contains the natural features of Rattlesnake Shoal, Maffitt's Channel, Main Ship Channel and Bar, and the throat of the harbor, as well as the military features of Forts Sumter, Moultrie, Ripley, Johnson, and Castle Pinckney. The Potential National Register Boundary encompasses all of the Study and Core Areas of the battlefield. Refer to Figure 63 that illustrates the Study and Core Areas, Potential National Register Boundary, and the archeological Defining Features, including the Union and Confederate naval battle routes of the battlefield. The historical and archeological research undertaken to meet these objectives has provided solid evidentiary data to identify, define, and delineate the boundaries of the Charleston Harbor Naval Battlefield.

Using multiple avenues of inquiry regarding historical and archeological research provided the context by which to define the battle events, boundary, and the remaining archeological features of the battlefield. Historical research at several archival repositories, online resources, the published *ORN* and *ORA*, reports, letters, newspapers, maps, and photographs provided the materials by which to interpret the battle sequences. While many actions on the naval battlefield were well-known, such as the *H. L. Hunley* attack on the *Housatonic*, research aided in understanding other lesser affairs regarding the implementation of the blockade, especially related to the actions related to contesting the entrance and exit to blockade runners which resulted in their demise. Research to determine the archeological potential of the battlefield uncovered lesser known sites, namely the sinking of the *Manigault* and Payne's Wharf behind Morris Island, and to the remains of

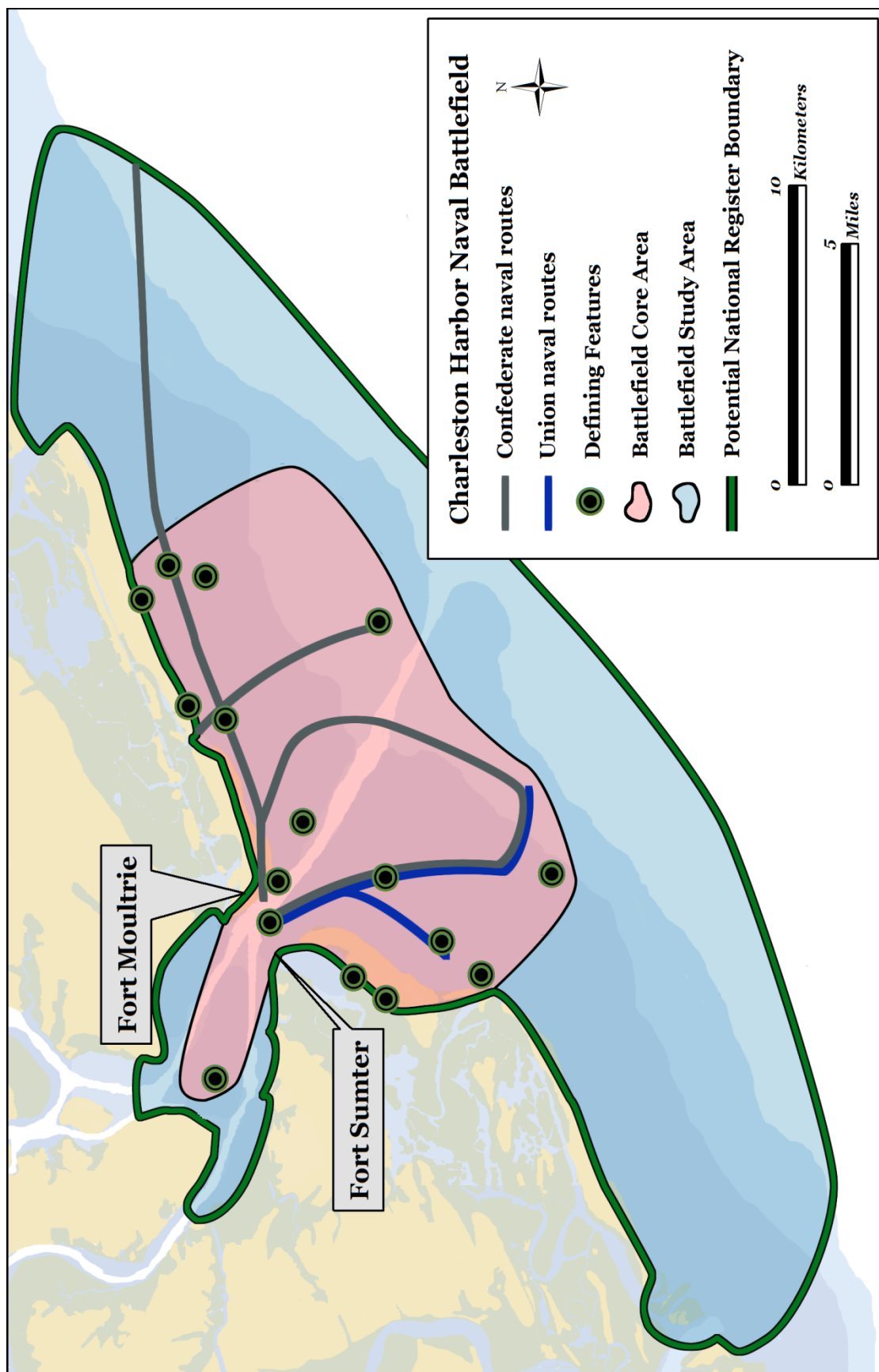


Figure 63: Charleston Harbor Naval Battlefield Boundary and Defining Features (NOAA chart 11521, scale 1:80,000, 2010; SCIAA graphic).

Etiwan most likely still lying somewhere between Fort Sumter and Fort Johnson. Previous work by other organizations also aided in determining the location and condition of a number of archeological resources at Charleston Harbor. The combination of the two sources of information guided subsequent archeological investigations to verify, to pinpoint locations, and to gather baseline electronic and visual information about the remaining components on the naval battlefield.

The fieldwork portion of the project documented a number of archeological remnants on the naval battlefield. These remnants of the naval actions were precisely located with DGPS and investigated through electronic means to determine their scope and extent. Visual inspection by underwater archeologists aided in interpreting the visible features of these sites. Sites examined included several shipwrecks by electronic means, *Keokuk*, *Weehawken*, and *Norseman*, and visual inspection by divers of *Georgiana*, *Mary Bowers*, and *Constance*. A week of diving on the remains of the Federal ironclad *Patapsco* documented in preliminary fashion the extant structure in the throat of the harbor. Efforts at determining the existence of more elusive sites, such as the 7 April 1863 ironclad battleground and Battery Wagner, provided potential indications of the locations, but require additional investigations to define and confirm the presence of these areas. The results of the surveys to locate the two stone fleets indicate that the remains of the First Stone Fleet were tentatively located, while the absence of the Second Stone Fleet in the initial survey area will guide future survey operations to find their remains. Terrestrial fieldwork at the Swamp Angel and the “Devil,” along with the gradiometer investigation of the buried blockade runners on Isle of Palms and Sullivan’s Island, helped to confirm the presence, location, and identity of several of these sites. The underwater and terrestrial fieldwork aided in locating many of the defining cultural features of the naval battlefield. While all findings were not conclusive in regards to determining the presence of some of these archeological components, for instance, Second Stone Fleet or *Etiwan*, the results will serve to guide future research efforts to examine the naval battlefield.

An important research goal was to gather historical, archeological, and environmental information and apply that data to a set of military considerations known by the acronym KOCOA by which to interpret the Charleston Harbor Naval Battlefield. An important dataset was the 1865 nautical chart that showed the Confederate defenses and other features that was georeferenced and offered guidance not only in locating archeological features but also in determining the military use of the harbor. The KOCOA scheme provided a framework to determine the key natural, cultural, and military features that influenced the outcome of the battlefield. Each Union and Confederate battle episode was affected by similar constraints that determined the manner of defense and attack. The most revealing fact of the conflict in the coastal environment was the use of the cloak of darkness to evade detection until administering a blow, evidenced that most actions occurred during the night, including all of the Confederate strikes upon the Union fleet. Another insight was gleaned from the position of the wrecked blockade runners that revealed their “end-around” attempts to evade the Second Stone Fleet and the wooden and ironclad blockaders via Maffitt’s/Beach Channel.

There have been significant physical changes to the naval battlefield, primarily a result of the placement of two jetties to form a more direct channel through the bar to the port. The natural features of the ebb-delta complex consisting of the bar and channels have been completely altered by the construction of the jetties that essentially eradicated the two primary Civil War-era channels leading into the harbor: Main Ship Channel and Maffitt's/Beach Channel. The beachfront of the islands of Sullivan's Island and the south end of the island have accreted seawards, evidenced by the presence of several buried blockade runners. Morris Island, however, has suffered from severe erosion south of the south jetty, with some accretion at Cummings Point. There are still natural, cultural, and military features a participant from the siege would recognize, but the built-up environment has also modified the battlefield with beachfront homes, bridges, and high-rise buildings. But one thing does continue, the port of Charleston has rebuilt itself into an important transshipment hub in the southeast, and the sea is still an important front door to the world. Establishing the battlefield boundary and the presence and distribution of the associated archeological components permitted meeting a corollary objective of the project to determine issues affecting the preservation and protection of the battlefield.

Federal and State Cultural Resource Legislation

There are a number of Federal and State cultural legislations that offer protection to the submerged and terrestrial resources on the battlefield. In regards to US Navy shipwrecks, i.e., *Patapsco*, *Weehawken*, *Keokuk*, and *Housatonic*, the Department of the Navy (DoN) maintains custody of these wrecks. The Naval History and Heritage Command's Underwater Archeology Branch (NHHC) manages the underwater archeological resources for the DoN. The NHHC ensures compliance with the National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.) and the Sunken Military Craft Act enacted in 2005 (H. R. 4200). Confederate property on the battlefield and work study area included the wrecks of *Etiwan*, *Stono*, *Celt*, *Manigault*, *Sumter*, *H. L. Hunley*, and CSA government cargo remaining on the sunken blockade runners. After the war, Federal legislation was passed giving title and ownership of Confederate properties to the United States (Secretary of Treasury-Function, 1965, as amended, Pub. L. 89-30, 79 Stat. 119, 40 U.S.C § 1309). The General Services Agency (GSA) manages the Confederate properties under this mandate, along with other Federal cultural resource legislation. An agreement hammered out between the Federal and State stakeholders after the discovery of *H. L. Hunley* stipulated that the Federal government retained title to the vessel but that South Carolina would have custody of the submarine in perpetuity (Murphy et al. 1996:12). The Confederate submarine was recovered in 2000 and currently resides in North Charleston undergoing conservation for eventual public display. The blockade runners, *Celt*, *Presto*, *Flora*, and *Beatrice*, presumed buried under Sullivan's Island are within the confines of Fort Moultrie, which is part of the National Park Service's Fort Sumter National Monument. These blockade runners are subsequently protected by Federal cultural legislation, primarily the National Historic Preservation Act (NHPA; Public Law 89-665; 16 U.S.C. 470 et seq.). The blockade runner *Stonewall Jackson* under the beach of Isle of Palms offers an interesting mix of Federal and State cultural legislation, along with local laws restricting beach activities. The sunken blockade runners, including *Constance*, *Mary Bowers*, *Georgiana*, *Raccoon*, *Minho*, *Prince Albert*, *Norseman*, *Rattlesnake*, and *Ruby*, were private commercial undertakings and are protected by the Abandoned Shipwreck

Act (Pub. L. 100-298; 43 U.S.C. 2101-2106). This act asserted Federal ownership of abandoned vessels on state bottomlands, but then transferred title to each state to manage. State legislation affecting these submerged cultural resources and the now inundated batteries, i.e., Battery Wagner and Fort Shaw, is the South Carolina Underwater Antiquities Act of 1991 (Article 5, Chapter 7, Title 54, Code of Laws of South Carolina, 1976). This legislation regulates impacts to shipwrecks and other underwater archeological materials on state submerged lands in the navigable rivers and out to the three-mile line in the Atlantic Ocean. A plethora of Federal and State legislation offer protection to these battlefield components, but these sites are situated within a developing harbor and region, and potential impacts related to navigation improvements and barrier island development are looming.

Preservation Issues

There are two major issues with the potential to adversely impact the archeological resources within the battlefield boundary: navigational improvements related to channel deepening and widening, and beach renourishment projects to protect private and public property on the barrier islands. The improvement to navigation in the harbor is not a new issue. The destruction of many of the shipwreck components of the battlefield, namely the Federal and Confederate ironclads, *Housatonic*, and the blockade runners at Fort Moultrie and Bowman's Jetty, were instigated by the needs of improving harbor navigation in the 1870s and early 1900s. Another round of navigation improvements in the 1920s in the Cooper River impacted the remains of the three Confederate ironclads, *Palmetto State*, *Chicora*, and *Charleston*. These projects compromised the archeological integrity of these sites through the removal of ship structure, artifacts, and human remains.

Planned modern navigation improvement projects are currently directed towards accommodating the increasing size of container ships entering the port of Charleston. The reason for the proposed channel deepening and widening project is the completion of the Panama Canal Expansion in 2014. The expansion of the canal will create a new type of container ship, called a post-Panamax ship with a 15.2 m (50 ft) draft. A number of Eastern seaports have already rushed to dredge to accommodate these ships. Currently, Charleston is the 4th busiest port on the East Coast and the 12th nationally. The current channel depth is 13.7 m (45 ft), and with a high tide can currently accommodate ships with drafts of 14.6 m (47 ft). The SC State Ports Authority wants the channel dredged to 15.2 m (50 ft) at mean low water to accommodate these vessels to ensure Charleston's and the region's economic health (*Post and Courier* 2 September 2010; <http://www.port-of-charleston.com/spa/> [5 April 2011]).

The second potential issue impacting battlefield cultural resources is beach renourishment projects. These projects redistribute sand from offshore borrow sites to onshore beaches. Most recently beach renourishment occurred on the north end of Isle of Palms and at the south end of Folly Beach. Each storm and subsequent loss of beach raises the need for restoring the beach to protect public and private property, and to maintain the recreational value of the islands.

The potential impacts to the battlefield resources by the navigation improvement and beach renourishment projects are both direct and indirect by nature. Fortunately, the direct impact to these resources can be mitigated through proper management oversight. Each of these projects is overseen by the US Army Corps of Engineers, Charleston District that ensures compliance to appropriate Federal cultural resource legislation. In the case of both of these dredging projects, the primary legislation is the NHPA, especially sections 106 and 110. Section 106 of the NHPA mandates that each Federal agency identifies conflicts between historic resources and any potential undertaking that is federally funded. Potential conflicts include the use of dredges, both cutter head and clamshell types, which could strike and damage a shipwreck. Section 110 of the NHPA directs the Federal agency to consider the preservation of these historic properties within their jurisdiction. The Federal agencies work in cooperation with the State Historic Preservation Officer at the SC Department of Archives and History, and in consultation with the MRD concerning potential impacts to underwater archeological resources in state waterways. By these means, potential direct physical impacts to underwater cultural heritage can be avoided. Direct physical impacts can be mitigated, but these projects may have indirect and unforeseen impacts affecting the equilibrium of the wreck's environment which have been reached through decades underwater. One potential outcome affecting a site is current acceleration that may hasten sediment loss, among other negative effects.

The battlefield resources most vulnerable to these potential impacts to their preservation are the ones located offshore and along the channel entrance to the harbor. The offshore resources include *Georgiana*, *Mary Bowers*, *Constance*, and the Second Stone Fleet that would be within or near available borrow sites for beach renourishment projects for Sullivan's Island or Isle of Palms. The inshore wrecks of *Stonewall Jackson*, *Rattlesnake*, and *Norseman* could also be impacted through the land moving equipment brought in to distribute the sand on the beach. Resources potentially impacted by deepening and widening of the entrance channel include the Bowman's Jetty shipwrecks, *Raccoon*, *Sumter*, and *Patapsco*. These sites are adjacent to the channel and could possibly be indirectly impacted by changing current patterns or velocities hastening the deterioration of remaining ship structure and artifacts as a result of deepening and widening the channel.

As mentioned above, a primary objective of the project was to identify defining features of the battlefield and to precisely locate their position on the battlefield. In early 2000, an issue arose due to the three reported locations, including one in the main channel, of the remains of *Patapsco* in the State Archeological Site Files. The US Army Corps of Engineers, Charleston District, contacted the MRD to assist in verifying the exact location of the wreck. The Corps request was made during the initial stages of studying the potential effects of the deepening and widening project of the harbor channel. Fortunately the request was made while MRD was implementing the Naval Wreck Survey, which was able to locate and provide the correct DGPS coordinates of the wreck. The position of many of the wrecks in the battlefield were also imprecisely known, or even undetected, and through this project more precise DGPS coordinates were obtained, electronic data gathered to determine the scope and extent of a site, and if negative data obtained, at least determined where the wreck or site was not. Documenting the exact location of these sites will help to mitigate any navigation improvement or beach renourishment projects to these naval battlefield resources.

National Register of Historic Places

The National Register of Historic Places program was authorized by Congress in 1966 to encourage the preservation of cultural resources important in America's history. Later, Congress authorized enlargement of the program to include vessels, canals, shipyards, and shipwrecks (Delgado 1985:1). As a component of the NHPA, the National Register seeks to coordinate and assist private and public efforts to identify, evaluate, and protect historic and archeological resources. Diverse properties are eligible and listed in the National Register that includes districts, sites, buildings, structures, and objects that are significant to American history, architecture, archeology, engineering, and culture. The National Register is administered by the NPS (<http://www.nationalregisterofhistoricplaces.com/> [6 March 2012]). Nationally significant shipwrecks are also potentially eligible as a National Historic Landmark, another program of the Federal NHPA legislation (Delgado 1985:20).

The National Register type of historic vessels eligible for nomination that is pertinent to this report is Category 5-Shipwrecks. Several criteria are used to determine the eligibility and significance of a shipwreck for nomination to the National Register. These criteria are:

- A. must be associated with events that have made a significant contribution to the broad patterns of our history; or
- B. must be associated with the lives of persons significant in our past; or
- C. must embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- D. have yielded, or may be likely to yield, information important in prehistory or history.

Each criterion also has several areas of significance to consider under each category including agriculture, engineering, and military for Criterion A; links to a famous person along with several applicable topics shared with Criterion A for Criterion B; architecture, art, and engineering for Criterion C; and information that can be extracted from the remains of a vessel, typically a shipwreck, but can also be floating, for Criterion D (Delgado 1985:6-8). There are three potential recommendations for inclusion in the National Register: Eligible, Not Eligible, and Potentially Eligible.

Recommendations for inclusion in the National Register are herein made for each of the cultural resources associated with the Charleston Harbor battlefield (Table 1). Each of the shipwrecks or assemblages of shipwrecks, i.e., the First and Second Stone Fleets, and other related resources is eligible for nomination to the National Register. The military significance of each wreck and period of operation makes each worthy of nomination to the National Register. Significance regarding ship architecture is applicable to a number of the shipwrecks, especially *Keokuk*, an experimental ironclad design during the Civil War. The First and Second Stone Fleets, comprised of purchased ex-whale and merchant ships are representatives of ships having dual careers as commercial watercraft prior to their use to meet the exigencies of war. In addition to nominating each of the individual sites,

Table 1: Charleston Harbor Naval Battlefield resources with potential inclusion into National Register of Historic Places.

Feature Name	Criterion	Significance	Eligibility
Battery Wagner	A	Military	Eligible
<i>Constance</i>	A, D	Commerce	Eligible
<i>Georgiana</i>	A, D	Commerce, Architecture	Eligible
First Stone Fleet	A, D	Military, Commerce	Eligible
Second Stone Fleet	A, D	Military, Commerce	Eligible
Fort Ripley	A	Military	Eligible
<i>Housatonic</i>	A, D	Military	Eligible
<i>Keokuk</i>	A, ,C, D	Military, Architecture	Eligible
<i>Mary Bowers</i>	A	Commerce	Eligible
<i>Minho</i>	A	Commerce	Eligible
<i>Patapsco</i>	A, C, D	Military, Architecture	Eligible
<i>Raccoon</i>	A	Commerce	Eligible
<i>Rattlesnake</i>	A	Commerce	Eligible
<i>Ruby</i>	A	Commerce	Eligible
<i>Stonewall Jackson</i>	A	Commerce	Eligible
<i>Stono</i>	A, C, D	Military	Eligible
Swamp Angel	A	Military	Eligible
<i>Weehawken</i>	A, C, D	Military, Architecture	Eligible
<i>Weehawken Raft</i>		Military, Architecture	Eligible

another alternative is to nominate them as a group within the Potential National Register Boundary delineated through the project, similar to the Cape Fear Civil War Shipwreck Discontiguous District in North Carolina (Wilde-Ramsing and Angley 1985).

Potential Scientific, Educational, and Recreational Values

Determination of the potential scientific, educational, and recreational value of each documented archeological battlefield component will aid in shaping management policy regarding future inquiry and promotion of public access to these submerged cultural resources (Table 2). Each of the shipwrecks and related cultural features has some scientific and educational benefit based on its affiliation with the naval battlefield, although its inherent values will be tempered by the extent of remaining structure and artifacts. Archeological investigations to reap the scientific and educational benefits from these sites would include limited excavations of buried sites and documentation of visible structure. The potential of these wrecks to contribute to the historical and archeological corpus of knowledge regarding the context of the Charleston Harbor Naval Battlefield within the American Civil War is significant and important to the nation and to South Carolina.

Table 2: Determination of scientific, educational, and recreational value of Charleston Harbor Naval Battlefield shipwrecks and features.

Feature Name	Scientific	Educational	Recreational
Battery Wagner	Yes	Yes	Low
<i>Constance</i>	Yes	Yes	High
First Stone Fleet	Yes	Yes	Moderate
Fort Ripley	Yes	Yes	High
<i>Georgiana</i>	Yes	Yes	Moderate
<i>Housatonic</i>	Yes	Yes	None
<i>Keokuk</i>	Yes	Yes	None
<i>Mary Bowers</i>	Yes	Yes	Moderate
<i>Minho</i>	Yes	Yes	Low
<i>Patapsco</i>	Yes	Yes	Low
<i>Raccoon</i>	Yes	Yes	None
<i>Rattlesnake</i>	Yes	Yes	None
<i>Ruby</i>	Yes	Yes	None
<i>Stonewall Jackson</i>	Yes	Yes	None
<i>Stono</i>	Yes	Yes	Low
Second Stone Fleet	Yes	Yes	Potential
<i>Stono</i>	Yes	Yes	Low
Swamp Angel	Yes	Yes	Moderate
<i>Weehawken</i>	Yes	Yes	None
<i>Weehawken Raft</i>	Yes	Yes	Moderate

Recreational desirability of wreck sites includes easy and predictable access, historical significance, archeological integrity, and photogenic quality, among other virtues that enhance public access to submerged cultural resources. The recreational value of many of the wrecks and related features is limited due to being buried and therefore allows no physical human presence on the site. The known wrecks and features with visible structure on the battlefield are *Patapsco*, the wrecks at the end of Bowman's Jetty, i.e., *Stono*, *Minho*, possibly *Prince Albert*, and *Georgiana*, *Mary Bowers*, and *Constance* and the remains of Fort Ripley. The *Patapsco* and Bowman's Jetty wrecks are situated in the harbor entrance to Charleston and are swept by powerful currents and plagued by near-zero visibility. Their recreational value would be limited by these factors, which in turn should restrict access to sport divers experienced in current and dark water diving. Essentially, these sites would force the diver to concentrate on maintaining control in this rugged environment rather than allowing for a pleasurable dive in which they could take photographs and enjoy the surroundings. Similar conditions affect the *Georgiana* and *Mary Bowers* wreck complex, although currents are not strong, poor visibility and strong surge require constant attention to the surrounding and jagged wreck structure. The potential for public access to these sites is certainly feasible, especially in light of Maryland's underwater archeological preserve on the submarine *U-1105*, in Chesapeake Bay, in similar conditions but much deeper water.

The remains of the *Constance*, Fort Ripley, and the First Stone Fleet, on the other hand, are situated in environments that would provide more pleasurable recreational diving

opportunities. Surprisingly, the remains of Fort Ripley in the harbor off the Battery offered excellent visibility and a range of depths from very shallow to approximately 12.2 m (40 ft). Constructed of the rubble from the Charleston Fire of December 1861, remains of the bedding logs to support the battery remain visible in places. Additionally, yellow sea whips and other marine fauna and flora inhabit the stone and brick rubble. *Constance*, lying on a sandy bottom offshore of Isle of Palms, affords a pleasant dive with good visibility and recognizable ship structure. Future investigations of the First Stone Fleet will determine their potential recreational value, in relation to site conditions, as the historical and archeological value is significant as one of the largest collection of New England whalers and other ship types in existence, followed by the nearby Second Stone Fleet.

Recommendations

Several recommendations are offered to continue developing the historical and archeological interpretation and preservation of the Charleston Harbor Naval Battlefield:

Continue fieldwork operations

Field operations should be directed initially towards positioning shipwrecks that were not located or imprecisely located during the project, namely *Rattlesnake*, *Norseman*, the wrecks under the beach at Bowman's Jetty, *Etiwan*, *Manigault* and the Second Stone Fleet. The discovery of the First Stone Fleet ballast mounds requires inspection to gather additional archeological information at each of the wrecks. Ground-truthing of the magnetic anomalies in the Battery Wagner and 7 April 1863 battleground and the acoustic anomalies in the frame torpedo survey areas requires a concerted and systematic effort to determine the nature and relationship of these anomalies to the battlefield events that occurred in each location. Additional work on documenting *Patapsco*, the only Civil War ironclad in South Carolina having portions of ship structure exposed, would prove useful in identifying the extant remains, only preliminarily investigated during the project. The other two ironclad sites, *Weehawken* and *Keokuk*, buried under several feet of overburden, would require extensive hydraulic probing to determine the depth of sediment at each site. Perhaps, if the depth of overburden covering parts of the site does not preclude archeological investigation, conducting one or more test excavation units could help to ascertain the identity and preservation of ship structure at the site as was accomplished on the remains of *Housatonic*. A thorough documentation of the Ericsson Obstruction Remover, aka "Devil," would also prove fruitful in documenting this unique naval artifact. In essence, while the project has initiated the study of the battlefield, much work remains to gain a fuller understanding of the naval actions manifested in the archeological components remaining in Charleston Harbor.

Prepare National Register of Historic Places nominations for known shipwrecks.

NRHP nominations should be prepared for all of the shipwrecks as information becomes available, but immediate priorities should include *Housatonic* and *Stono*. Archeological and historical investigations from the 1999 *Housatonic* expedition have revealed information that can be used to prepare the nomination. In addition to representing

the remains of a Union blockader, the ship is significant as the first casualty of submarine warfare. A NRHP nomination for *Stono* should be prepared as historical and archeological work, albeit under the auspice of salvage, has revealed an extensive amount of information about the site. The site is significant for a number of reasons, most importantly as a rare example of Union blockader turned Confederate blockade-runner. Another candidate worth nomination is *Patapsco*, which was visually investigated during the course of this project, subsequently increasing the understanding of the remaining ship structure. The remaining shipwrecks require additional examination, including determining precise locations and extent of the archeological remains, prior to NHRP nomination. Besides individual nominations, nominating the entire battlefield as a Civil War shipwreck district, comparable to Cape Fear Civil War Shipwreck Discontiguous District in North Carolina, would demonstrate the cohesive nature of these archeological components.

Continue building and maintaining the GIS database and datasets as information emerges.

As additional fieldwork and information relating to Charleston Harbor Naval Battlefield accrues, the information should be processed into GIS format. Anticipated GIS themes or layers of information include georeferenced historical maps and charts, remote sensing data, and archeological recordation of shipwrecks. This information should be standardized and FGDC-compliant in order to maintain up-to-date duplicate GIS projects for reference and research purposes. An on-going GIS project this would allow for quick management responses regarding potential impacts to the shipwrecks and other sites and guide future research initiatives by SCIAA and other organizations.

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